

# LVV-T2214 - MTMount\_Elevation\_Changes\_with\_MTAOS\_AI

This notebook was originally written by Bo Xin in the [lsst-ts/ts\\_notebooks](#) repository.  
It is a modified version with updated commands and simplified steps.

**Make sure you run this notebook on TTS before running at the summit.**

## Requirements

This notebooks require some extra repositories to be installed locally so it can grab some constants and some look-up tables.

Here is a list of which repos are these:

- [lsst-ts/ts\\_cRIOpy](#)

To install them, open a terminal and run the following commands:

```
git clone https://github.com/lsst-ts/ts_cRIOpy
$HOME/notebooks/lsst-ts/ts_cRIOpy
git clone https://github.com/lsst-ts/ts_m1m3support.git
$HOME/notebooks/lsst-ts/ts_m1m3support
git clone https://github.com/lsst-ts/ts_config_mttcs
$HOME/notebooks/lsst-ts/ts_config_mttcs
git clone https://github.com/lsst-sitcom/M2_FEA
$HOME/notebooks/lsst-sitcom/M2_FEA
```

And add these lines to your `$HOME/notebooks/.user_setup` file:

```
setup -j notebooks_vandv -r ~/notebooks/lsst-
sitcom/notebooks_vandv
setup -j ts_cRIOpy -r $HOME/notebooks/lsst-ts/ts_cRIOpy
```

In [6]: `%load_ext autoreload  
%autoreload 2`

The autoreload extension is already loaded. To reload it, use:  
`%reload_ext autoreload`

In [7]: `from lsst.sitcom import vandv  
  
exec_info = vandv.ExecutionInfo()  
print(exec_info)`

Executed by b1quint on 2022-06-21T01:50:49.398.  
Running in yagan07 at summit

## Setup Notebook for Test

- Import all libraries
- Get the remotes ready

```
In [8]: test_execution = "LVV-D220620"
```

```
In [9]: import asyncio
import os
import yaml

import astropy.units as u
import numpy as np
import matplotlib.pyplot as plt
import pandas as pd
import time
import warnings

from astropy.time import Time, TimeDelta
from astropy.coordinates import AltAz, ICRS, EarthLocation, Angle, FK5
from datetime import datetime, timedelta

from lsst_efd_client import EfdClient
from lsst.ts import utils, salobj
from lsst.ts.cRIOpy import M1M3FATable
from lsst.ts.observatory.control.maintel.mtcs import MTCS, MTCSUsages
from lsst.ts.observatory.control import RotType
```

```
In [10]: print(os.environ.get("LSST_DDS_DOMAIN_ID"))
```

```
0
```

```
In [11]: print(os.environ["OSPL_URI"])
print(os.environ["LSST_DDS_PARTITION_PREFIX"])
print(os.environ.get("LSST_DDS_DOMAIN_ID"))
```

```
file:///home/b1quint/WORK/ts_ddsconfig/config/ospl-shmem.xml
summit
0
```

```
In [12]: logging.basicConfig(format"%(name)s:%(message)s", level=logging.DEBUG)
```

```
In [13]: log = logging.getLogger("setup")
log.level = logging.DEBUG
```

```
In [14]: domain = salobj.Domain()
```

```
In [15]: mtcs = MTCS(domain=domain, log=log)
mtcs.set_rem_loglevel(40)
```

```
setup.MTCS DEBUG: mtmount: Adding all resources.
setup.MTCS DEBUG: mtptg: Adding all resources.
setup.MTCS DEBUG: mtaos: Adding all resources.
setup.MTCS DEBUG: mtm1m3: Adding all resources.
setup.MTCS DEBUG: mtm2: Adding all resources.
setup.MTCS DEBUG: mthexapod_1: Adding all resources.
```

```
setup.MTCS DEBUG: mthexapod_2: Adding all resources.  
setup.MTCS DEBUG: mtrotator: Adding all resources.  
setup.MTCS DEBUG: mtdome: Adding all resources.  
setup.MTCS DEBUG: mtdometrajectory: Adding all resources.  
MTHexapod INFO: Read historical data in 0.03 sec  
MTHexapod INFO: Read historical data in 0.04 sec  
MTHexapod.actuators WARNING: tel_actuators DDS read queue is filling: 64 of  
100 elements  
MTRotator.rotation ERROR: tel_rotation DDS read queue is full (100 element  
s); data may be lost  
MTMount.elevation ERROR: tel_elevation DDS read queue is full (100 element  
s); data may be lost  
MTM1M3.powerSupplyData ERROR: tel_powerSupplyData DDS read queue is full (1  
00 elements); data may be lost  
MTHexapod.electrical ERROR: tel_electrical DDS read queue is full (100 elem  
ents); data may be lost  
MTRotator.motors ERROR: tel_motors DDS read queue is full (100 elements); d  
ata may be lost  
MTHexapod.application WARNING: tel_application DDS read queue is filling: 1  
0 of 100 elements  
MTHexapod.application ERROR: tel_application DDS read queue is full (100 el  
ements); data may be lost  
MTRotator.electrical ERROR: tel_electrical DDS read queue is full (100 elem  
ents); data may be lost  
MTHexapod.actuators WARNING: tel_actuators DDS read queue is filling: 10 of  
100 elements  
MTHexapod.actuators ERROR: tel_actuators DDS read queue is full (100 elem  
ents); data may be lost  
MTMount.azimuth ERROR: tel_azimuth DDS read queue is full (100 elements); d  
ata may be lost  
MTRotator.ccwFollowingError ERROR: tel_ccwFollowingError DDS read queue is  
full (100 elements); data may be lost  
MTPtg.mountPosition ERROR: tel_mountPosition DDS read queue is full (100 el  
ements); data may be lost  
MTM1M3.pidData ERROR: tel_pidData DDS read queue is full (100 elements); da  
ta may be lost  
MTM1M3.outerLoopData ERROR: tel_outerLoopData DDS read queue is full (100 e  
lements); data may be lost  
MTM1M3.inclinometerData ERROR: tel_inclinometerData DDS read queue is full  
(100 elements); data may be lost  
MTM1M3.imsData ERROR: tel_imsData DDS read queue is full (100 elements); da  
ta may be lost  
MTM1M3.hardpointMonitorData ERROR: tel_hardpointMonitorData DDS read queue  
is full (100 elements); data may be lost  
MTM1M3.hardpointActuatorData ERROR: tel_hardpointActuatorData DDS read queu  
e is full (100 elements); data may be lost  
MTM1M3.forceActuatorData ERROR: tel_forceActuatorData DDS read queue is ful  
l (100 elements); data may be lost  
MTM1M3.accelerometerData ERROR: tel_accelerometerData DDS read queue is ful  
l (100 elements); data may be lost  
MTM1M3.powerSupplyData ERROR: tel_powerSupplyData DDS read queue is full (1  
00 elements); data may be lost
```

In [16]: `await mtcs.start_task`

Out[16]: `[None, None, None, None, None, None, None, None, None, None]`

```
MTM1M3.powerSupplyData ERROR: tel_powerSupplyData DDS read queue is full (100 elements); data may be lost
MTM1M3.inclinometerData ERROR: tel_inclinometerData DDS read queue is full (100 elements); data may be lost
MTM1M3.accelerometerData ERROR: tel_accelerometerData DDS read queue is full (100 elements); data may be lost
MTM1M3.inclinometerData ERROR: tel_inclinometerData DDS read queue is full (100 elements); data may be lost
MTM1M3.accelerometerData ERROR: tel_accelerometerData DDS read queue is full (100 elements); data may be lost
MTM1M3.accelerometerData ERROR: tel_accelerometerData DDS read queue is full (100 elements); data may be lost
MTM1M3.powerSupplyData ERROR: tel_powerSupplyData DDS read queue is full (100 elements); data may be lost
MTM1M3.inclinometerData ERROR: tel_inclinometerData DDS read queue is full (100 elements); data may be lost
MTM1M3.accelerometerData ERROR: tel_accelerometerData DDS read queue is full (100 elements); data may be lost
MTM1M3.accelerometerData ERROR: tel_accelerometerData DDS read queue is full (100 elements); data may be lost
MTM1M3.accelerometerData ERROR: tel_accelerometerData DDS read queue is full (100 elements); data may be lost
```

In [17]: `warnings.filterwarnings("ignore", message=".*DDS read queue.*")`

## Helper Functions

In [18]: `async def get_data_from_efd(location, start, end):`

```
"""
Retrieves data relevant for analysis.

Parameters
-----
location : str
    In which Test Stand are you running this test?
start : str or datetime
    Start of the time-window.
end : str or datetime
    End of the time-window.
"""

if location == "summit":
    client = EfdClient("summit_efd")
elif location == "tucson":
    client = EfdClient("tucson_teststand_efd")
else:
    raise ValueError(
        "Location does not match any valid options {summit|tucson}"
    )
```

```

_df_mount_el = await client.select_time_series(
    "lsst.sal.MTMount.elevation",
    fields="actualPosition",
    start=start,
    end=end,
)

_df_m1m3_101 = await client.select_time_series(
    "lsst.sal.MTM1M3.forceActuatorData",
    fields="zForce101",
    start=start,
    end=end,
)

# M2_B1?
_df_m2 = await client.select_time_series(
    "lsst.sal.MTM2.axialForce",
    fields=[
        "applied0",
        "lutGravity0",
        "measured0"
    ],
    start=start,
    end=end,
)

# CamHex Y position
_df_camhex = await client.select_time_series(
    "lsst.sal.MTHexapod.application",
    fields=[
        "position1"
    ],
    index=1,
    start=start,
    end=end,
)

# M2Hex Y position
_df_m2hex = await client.select_time_series(
    "lsst.sal.MTHexapod.application",
    fields=[
        "position1"
    ],
    index=2,
    start=start,
    end=end,
)

# Rename columns
_df_mount_el.rename(columns={"actualPosition": "mount_el"}, inplace=True)
_df_m1m3_101.rename(columns={"zForce101": "m1m3_z101"}, inplace=True)
_df_m2.rename(columns={"applied0": "m2b1_applied", "lutGravity0": "m2b1_gra"})
_df_camhex.rename(columns={"position1": "camhex_y"}, inplace=True)
_df_m2hex.rename(columns={"position1": "m2hex_y"}, inplace=True)

# Join dataframes
_df = _df_mount_el

_df = pd.merge(

```

```

        _df,
        _df_m1m3_101,
        left_index=True,
        right_index=True,
        how="outer"
    )

    _df = pd.merge(
        _df,
        _df_m2,
        left_index=True,
        right_index=True,
        how="outer"
    )

    _df = pd.merge(
        _df,
        _df_camhex,
        left_index=True,
        right_index=True,
        how="outer"
    )

    _df = pd.merge(
        _df,
        _df_m2hex,
        left_index=True,
        right_index=True,
        how="outer"
    )

    return _df

```

In [19]: `async def moveMountInElevationSteps(target_el, azimuth=0, step_size=0.25, time_
 """Move the mount from the current elevation angle to the target elevation
 in steps to avoid any issues whe M1M3 and/or M2 are running with the LUT us
 Mount instead of the inclinometer.`

This function will actually calculate the number of steps using the ceiling
in order to make sure that we move carefully.

Parameters

-----

`target_el : float
 Target elevation angle in degrees
azimuth : float
 Azimuth angle in degres (default)
step_size : float
 Step elevation size in degrees (default: 0.25)
time_sleep : float
 Sleep time between movements (default: 1)`

Returns

-----

`azimuth : float
 Current azimuth
elevation : float
 Current elevation
"""`

```

current_el = mtcs.rem.mtmount.tel_elevation.get().actualPosition
n_steps = int(np.ceil(np.abs(current_el - target_el) / step_size))

for el in np.linspace(current_el, target_el, n_steps):
    print(f"Moving elevation to {el:.2f} deg")
    await mtcs.rem.mtmount.cmd_moveToTarget.set_start(azimuth=azimuth, elev=elev)
    time.sleep(time_sleep)

return azimuth, el

```

## Start all the components, and put them in an enabled state.

Depending on which test cycle this is being executed in, each component is either a hardware component or a simulator:

- [ ] M1M3
- [ ] M2
- [ ] M2 Hexapod
- [ ] Camera Hexapod
- [ ] MTMount
- [ ] MTRotator
- [ ] MTPtg

The best/simplest way of doing this is running the notebook that executes the [LVV-T2344](#) test case.

This notebook puts all the components in a ENABLED state.

```
In [20]: # Verify that all the components have heartbeats
await mtcs.assert_liveliness()
```

```
In [21]: # Verify that all the components are enabled
await mtcs.assert_all_enabled()
```

First we slew and track at 89.5 degrees elevation

---

## Check elevation motion is smooth and no abrupt changes occur (Otherwise it faults M1M3)

Do the following slew sequence, watch chronograph to make sure there is no abrupt change in elevation angle (otherwise it faults M1M3).

Do 4 slews in sequence. For each slew, track for 39s, simulating a visit. Note: the 4 slews need to correspond to elevation angle between 86.5 deg and 82 deg. And, additional margin is needed due to tracking.

Move to zenith at the end (so that we can start m1m3 with LUT in mount telemetry mode)

```
In [22]: await mtcs.stop_tracking()
```

```
setup.MTCS DEBUG: Stop tracking.
```

```
In [23]: warnings.simplefilter("ignore")
await moveMountInElevationSteps(90., azimuth=190.5)
```

```
Moving elevation to 89.00 deg
```

```
Moving elevation to 89.33 deg
```

```
MTHexapod.electrical WARNING: tel_electrical DDS read queue is filling: 20  
of 100 elements
```

```
MTHexapod.electrical WARNING: tel_electrical DDS read queue is filling: 10  
of 100 elements
```

```
MTHexapod.application WARNING: tel_application DDS read queue is filling: 2  
1 of 100 elements
```

```
MTHexapod.application WARNING: tel_application DDS read queue is filling: 1  
1 of 100 elements
```

```
MTHexapod.actuators WARNING: tel_actuators DDS read queue is filling: 20 of  
100 elements
```

```
MTHexapod.actuators WARNING: tel_actuators DDS read queue is filling: 10 of  
100 elements
```

```
Moving elevation to 89.67 deg
```

```
MTHexapod.electrical WARNING: tel_electrical DDS read queue is filling: 10  
of 100 elements
```

```
MTHexapod.electrical WARNING: tel_electrical DDS read queue is filling: 20  
of 100 elements
```

```
MTHexapod.application WARNING: tel_application DDS read queue is filling: 1  
0 of 100 elements
```

```
MTHexapod.application WARNING: tel_application DDS read queue is filling: 2  
0 of 100 elements
```

```
MTHexapod.actuators WARNING: tel_actuators DDS read queue is filling: 19 of  
100 elements
```

```
Moving elevation to 90.00 deg
```

```
MTHexapod.electrical WARNING: tel_electrical DDS read queue is filling: 20  
of 100 elements
```

```
MTHexapod.application WARNING: tel_application DDS read queue is filling: 1  
0 of 100 elements
```

```
MTHexapod.application WARNING: tel_application DDS read queue is filling: 2  
0 of 100 elements
```

```
MTHexapod.actuators WARNING: tel_actuators DDS read queue is filling: 10 of  
100 elements
```

```
MTHexapod.actuators WARNING: tel_actuators DDS read queue is filling: 20 of  
100 elements
```

```
Out[23]: (190.5, 90.0)
```

```
MTHexapod.electrical WARNING: tel_electrical DDS read queue is filling: 21  
of 100 elements
```

```
MTHexapod.electrical WARNING: tel_electrical DDS read queue is filling: 10  
of 100 elements
```

```
MTHexapod.application WARNING: tel_application DDS read queue is filling: 2  
1 of 100 elements
```

```
| MTHexapod.application WARNING: tel_application DDS read queue is filling: 1  
| 0 of 100 elements
```

```
| MTHexapod.actuators WARNING: tel_actuators DDS read queue is filling: 20 of  
| 100 elements
```

In [ ]:

```
In [30]: t_start = Time(Time.now(), format='fits', scale='utc')  
print(f"Gathering data - Elevation motion test - Start time: {t_start}")  
  
az, el = await moveMountInElevationSteps(85.4, azimuth=190.5)  
  
print('Tracking first source')  
target_1 = mtcs.radec_from_azel(az=az, el=el)  
await mtcs.slew_icrs(ra=target_1.ra, dec=target_1.dec, rot_type=RotType.Physical)  
  
time.sleep(39.)  
await mtcs.stop_tracking()
```

```
Gathering data - Elevation motion test - Start time: 2022-06-20T23:30:09.793
```

```
Moving elevation to 90.00 deg
```

```
Moving elevation to 89.74 deg
```

```
| MTHexapod.electrical WARNING: tel_electrical DDS read queue is filling: 10  
| of 100 elements
```

```
| MTHexapod.electrical WARNING: tel_electrical DDS read queue is filling: 20  
| of 100 elements
```

```
| MTHexapod.application WARNING: tel_application DDS read queue is filling: 1  
| 1 of 100 elements
```

```
| MTHexapod.actuators WARNING: tel_actuators DDS read queue is filling: 10 of  
| 100 elements
```

```
| MTHexapod.application WARNING: tel_application DDS read queue is filling: 2  
| 1 of 100 elements
```

```
| MTHexapod.actuators WARNING: tel_actuators DDS read queue is filling: 20 of  
| 100 elements
```

```
Moving elevation to 89.49 deg
```

```
| MTHexapod.electrical WARNING: tel_electrical DDS read queue is filling: 10  
| of 100 elements
```

```
| MTHexapod.electrical WARNING: tel_electrical DDS read queue is filling: 20  
| of 100 elements
```

```
| MTHexapod.application WARNING: tel_application DDS read queue is filling: 1  
| 0 of 100 elements
```

```
| MTHexapod.application WARNING: tel_application DDS read queue is filling: 2  
| 0 of 100 elements
```

```
| MTHexapod.actuators WARNING: tel_actuators DDS read queue is filling: 21 of  
| 100 elements
```

```
Moving elevation to 89.23 deg
```

```
| MTHexapod.electrical WARNING: tel_electrical DDS read queue is filling: 10  
| of 100 elements
```

```
| MTHexapod.electrical WARNING: tel_electrical DDS read queue is filling: 20  
| of 100 elements
```

```
| MTHexapod.application WARNING: tel_application DDS read queue is filling: 1  
| 0 of 100 elements
```

```
| MTHexapod.application WARNING: tel_application DDS read queue is filling: 2  
| 0 of 100 elements
```

```
MTHexapod.actuators WARNING: tel_actuators DDS read queue is filling: 19 of
100 elements
Moving elevation to 88.98 deg
MTHexapod.electrical WARNING: tel_electrical DDS read queue is filling: 20
of 100 elements
MTHexapod.electrical WARNING: tel_electrical DDS read queue is filling: 10
of 100 elements
MTHexapod.application WARNING: tel_application DDS read queue is filling: 2
0 of 100 elements
MTHexapod.application WARNING: tel_application DDS read queue is filling: 1
0 of 100 elements
MTHexapod.actuators WARNING: tel_actuators DDS read queue is filling: 19 of
100 elements
Moving elevation to 88.72 deg
MTHexapod.electrical WARNING: tel_electrical DDS read queue is filling: 10
of 100 elements
MTHexapod.electrical WARNING: tel_electrical DDS read queue is filling: 20
of 100 elements
MTHexapod.application WARNING: tel_application DDS read queue is filling: 1
0 of 100 elements
MTHexapod.application WARNING: tel_application DDS read queue is filling: 2
0 of 100 elements
MTHexapod.actuators WARNING: tel_actuators DDS read queue is filling: 19 of
100 elements
MTHexapod.actuators WARNING: tel_actuators DDS read queue is filling: 10 of
100 elements
Moving elevation to 88.47 deg
MTHexapod.electrical WARNING: tel_electrical DDS read queue is filling: 20
of 100 elements
MTHexapod.electrical WARNING: tel_electrical DDS read queue is filling: 10
of 100 elements
MTHexapod.application WARNING: tel_application DDS read queue is filling: 1
0 of 100 elements
MTHexapod.application WARNING: tel_application DDS read queue is filling: 2
1 of 100 elements
MTHexapod.actuators WARNING: tel_actuators DDS read queue is filling: 20 of
100 elements
Moving elevation to 88.21 deg
MTHexapod.electrical WARNING: tel_electrical DDS read queue is filling: 10
of 100 elements
MTHexapod.electrical WARNING: tel_electrical DDS read queue is filling: 20
of 100 elements
MTHexapod.application WARNING: tel_application DDS read queue is filling: 1
0 of 100 elements
MTHexapod.application WARNING: tel_application DDS read queue is filling: 2
1 of 100 elements
MTHexapod.actuators WARNING: tel_actuators DDS read queue is filling: 20 of
100 elements
Moving elevation to 87.96 deg
MTHexapod.electrical WARNING: tel_electrical DDS read queue is filling: 20
of 100 elements
MTHexapod.electrical WARNING: tel_electrical DDS read queue is filling: 10
of 100 elements
```

```
MTHexapod.application WARNING: tel_application DDS read queue is filling: 2  
1 of 100 elements  
MTHexapod.application WARNING: tel_application DDS read queue is filling: 1  
0 of 100 elements  
MTHexapod.actuators WARNING: tel_actuators DDS read queue is filling: 20 of  
100 elements  
Moving elevation to 87.70 deg  
MTHexapod.electrical WARNING: tel_electrical DDS read queue is filling: 20  
of 100 elements  
MTHexapod.electrical WARNING: tel_electrical DDS read queue is filling: 10  
of 100 elements  
MTHexapod.application WARNING: tel_application DDS read queue is filling: 2  
0 of 100 elements  
MTHexapod.application WARNING: tel_application DDS read queue is filling: 1  
0 of 100 elements  
MTHexapod.actuators WARNING: tel_actuators DDS read queue is filling: 20 of  
100 elements  
MTHexapod.actuators WARNING: tel_actuators DDS read queue is filling: 10 of  
100 elements  
Moving elevation to 87.44 deg  
MTHexapod.electrical WARNING: tel_electrical DDS read queue is filling: 10  
of 100 elements  
MTHexapod.electrical WARNING: tel_electrical DDS read queue is filling: 20  
of 100 elements  
MTHexapod.application WARNING: tel_application DDS read queue is filling: 1  
0 of 100 elements  
MTHexapod.application WARNING: tel_application DDS read queue is filling: 2  
0 of 100 elements  
MTHexapod.actuators WARNING: tel_actuators DDS read queue is filling: 19 of  
100 elements  
Moving elevation to 87.19 deg  
MTHexapod.electrical WARNING: tel_electrical DDS read queue is filling: 20  
of 100 elements  
MTHexapod.electrical WARNING: tel_electrical DDS read queue is filling: 10  
of 100 elements  
MTHexapod.application WARNING: tel_application DDS read queue is filling: 2  
0 of 100 elements  
MTHexapod.application WARNING: tel_application DDS read queue is filling: 1  
0 of 100 elements  
MTHexapod.actuators WARNING: tel_actuators DDS read queue is filling: 19 of  
100 elements  
Moving elevation to 86.93 deg  
MTHexapod.electrical WARNING: tel_electrical DDS read queue is filling: 10  
of 100 elements  
MTHexapod.electrical WARNING: tel_electrical DDS read queue is filling: 20  
of 100 elements  
MTHexapod.application WARNING: tel_application DDS read queue is filling: 1  
0 of 100 elements  
MTHexapod.application WARNING: tel_application DDS read queue is filling: 2  
0 of 100 elements  
MTHexapod.actuators WARNING: tel_actuators DDS read queue is filling: 19 of  
100 elements  
Moving elevation to 86.68 deg
```

```
MTHexapod.electrical WARNING: tel_electrical DDS read queue is filling: 20
of 100 elements
MTHexapod.application WARNING: tel_application DDS read queue is filling: 2
0 of 100 elements
MTHexapod.actuators WARNING: tel_actuators DDS read queue is filling: 19 of
100 elements
MTHexapod.application WARNING: tel_application DDS read queue is filling: 1
0 of 100 elements
Moving elevation to 86.42 deg
MTHexapod.electrical WARNING: tel_electrical DDS read queue is filling: 20
of 100 elements
MTHexapod.electrical WARNING: tel_electrical DDS read queue is filling: 10
of 100 elements
MTHexapod.application WARNING: tel_application DDS read queue is filling: 1
0 of 100 elements
MTHexapod.application WARNING: tel_application DDS read queue is filling: 2
1 of 100 elements
MTHexapod.actuators WARNING: tel_actuators DDS read queue is filling: 20 of
100 elements
Moving elevation to 86.17 deg
MTHexapod.electrical WARNING: tel_electrical DDS read queue is filling: 20
of 100 elements
MTHexapod.electrical WARNING: tel_electrical DDS read queue is filling: 10
of 100 elements
MTHexapod.application WARNING: tel_application DDS read queue is filling: 2
0 of 100 elements
MTHexapod.application WARNING: tel_application DDS read queue is filling: 1
0 of 100 elements
MTHexapod.actuators WARNING: tel_actuators DDS read queue is filling: 20 of
100 elements
Moving elevation to 85.91 deg
MTHexapod.electrical WARNING: tel_electrical DDS read queue is filling: 10
of 100 elements
MTHexapod.electrical WARNING: tel_electrical DDS read queue is filling: 20
of 100 elements
MTHexapod.application WARNING: tel_application DDS read queue is filling: 1
0 of 100 elements
MTHexapod.application WARNING: tel_application DDS read queue is filling: 2
1 of 100 elements
MTHexapod.actuators WARNING: tel_actuators DDS read queue is filling: 20 of
100 elements
Moving elevation to 85.66 deg
MTHexapod.electrical WARNING: tel_electrical DDS read queue is filling: 20
of 100 elements
MTHexapod.electrical WARNING: tel_electrical DDS read queue is filling: 10
of 100 elements
MTHexapod.application WARNING: tel_application DDS read queue is filling: 2
0 of 100 elements
MTHexapod.application WARNING: tel_application DDS read queue is filling: 1
0 of 100 elements
MTHexapod.actuators WARNING: tel_actuators DDS read queue is filling: 20 of
100 elements
Moving elevation to 85.40 deg
```

```
MTHexapod.electrical WARNING: tel_electrical DDS read queue is filling: 10  
of 100 elements  
MTHexapod.electrical WARNING: tel_electrical DDS read queue is filling: 20  
of 100 elements  
MTHexapod.application WARNING: tel_application DDS read queue is filling: 1  
0 of 100 elements  
MTHexapod.application WARNING: tel_application DDS read queue is filling: 2  
0 of 100 elements  
MTHexapod.actuators WARNING: tel_actuators DDS read queue is filling: 20 of  
100 elements  
MTHexapod.actuators WARNING: tel_actuators DDS read queue is filling: 10 of  
100 elements
```

Tracking first source

```
WARNING: AstropyDeprecationWarning: Transforming a frame instance to a frame c  
lass (as opposed to another frame instance) will not be supported in the futur  
e. Either explicitly instantiate the target frame, or first convert the sourc  
e frame instance to a `astropy.coordinates.SkyCoord` and use its `transform_to  
()` method. [astropy.coordinates.baseframe]
```

```
astroquery WARNING: AstropyDeprecationWarning: Transforming a frame instanc  
e to a frame class (as opposed to another frame instance) will not be suppo  
rted in the future. Either explicitly instantiate the target frame, or fir  
st convert the source frame instance to a `astropy.coordinates.SkyCoord` an  
d use its `transform_to()` method.
```

```
setup.MTCS DEBUG: Setting rotator to physical fixed position 0.0 deg. Rotat  
or will not track.
```

```
MTHexapod.electrical WARNING: tel_electrical DDS read queue is filling: 36  
of 100 elements
```

```
MTHexapod.electrical WARNING: tel_electrical DDS read queue is filling: 18  
of 100 elements
```

```
MTHexapod.application WARNING: tel_application DDS read queue is filling: 3  
7 of 100 elements
```

```
MTHexapod.application WARNING: tel_application DDS read queue is filling: 1  
8 of 100 elements
```

```
MTHexapod.actuators WARNING: tel_actuators DDS read queue is filling: 36 of  
100 elements
```

```
MTHexapod.actuators WARNING: tel_actuators DDS read queue is filling: 18 of  
100 elements
```

```
setup.MTCS DEBUG: Wait 5.0s for rotator to settle down.
```

```
MTM1M3.logevent_appliedThermalForces ERROR: evt_appliedThermalForces DDS re  
ad queue is full (100 elements); data may be lost
```

```
MTM1M3.logevent_appliedStaticForces ERROR: evt_appliedStaticForces DDS read  
queue is full (100 elements); data may be lost
```

```
MTM1M3.logevent_appliedForces ERROR: evt_appliedForces DDS read queue is fu  
ll (100 elements); data may be lost
```

```
MTM1M3.logevent_appliedElevationForces ERROR: evt_appliedElevationForces DD  
S read queue is full (100 elements); data may be lost
```

```
MTM1M3.logevent_appliedCylinderForces ERROR: evt_appliedCylinderForces DDS  
read queue is full (100 elements); data may be lost
```

```
MTM1M3.logevent_appliedBalanceForces ERROR: evt_appliedBalanceForces DDS re  
ad queue is full (100 elements); data may be lost
```

```
MTM1M3.logevent_appliedAzimuthForces ERROR: evt_appliedAzimuthForces DDS re  
ad queue is full (100 elements); data may be lost
```

```
MTM1M3.logevent_appliedActiveOpticForces ERROR: evt_appliedActiveOpticForce
s DDS read queue is full (100 elements); data may be lost
MTM1M3.logevent_appliedAberrationForces ERROR: evt_appliedAberrationForces
DDS read queue is full (100 elements); data may be lost
setup.MTCS DEBUG: Workaround for rotator trajectory problem. Moving rotator
to its current position: -0.10
setup.MTCS DEBUG: Wait for MTRotator in position event.
setup.MTCS DEBUG: MTRotator in position: True.
setup.MTCS DEBUG: MTRotator already in position. Handling potential race co
ndition.
setup.MTCS INFO: MTRotator in position: False.
setup.MTCS INFO: MTRotator in position: True.
setup.MTCS DEBUG: MTRotator in position True. Waiting settle time 5.0s
setup.MTCS DEBUG: Sending slew command.
setup.MTCS DEBUG: Scheduling check coroutines
setup.MTCS DEBUG: process as completed...
setup.MTCS DEBUG: Monitor position started.
setup.MTCS DEBUG: Waiting for Target event from mtmount.
setup.MTCS DEBUG: mtmount: <State.ENABLED: 2>
setup.MTCS DEBUG: mpttg: <State.ENABLED: 2>
setup.MTCS DEBUG: mtaos: <State.ENABLED: 2>
setup.MTCS DEBUG: mtm1m3: <State.ENABLED: 2>
setup.MTCS DEBUG: mtm2: <State.ENABLED: 2>
setup.MTCS DEBUG: mthexapod_1: <State.ENABLED: 2>
setup.MTCS DEBUG: mthexapod_2: <State.ENABLED: 2>
setup.MTCS DEBUG: mtrotator: <State.ENABLED: 2>
setup.MTCS DEBUG: mtdome: <State.ENABLED: 2>
setup.MTCS DEBUG: mtodometajectory: <State.ENABLED: 2>
setup.MTCS DEBUG: Wait for mtmount in position events.
setup.MTCS DEBUG: Wait for dome in position event.
setup.MTCS DEBUG: Wait for MTRotator in position event.
setup.MTCS DEBUG: MTRotator in position: True.
setup.MTCS DEBUG: MTRotator already in position. Handling potential race co
ndition.
setup.MTCS DEBUG: Wait for MTMount elevation in position event.
setup.MTCS DEBUG: MTMount elevation in position: True.
setup.MTCS DEBUG: MTMount elevation already in position. Handling potential r
ace condition.
setup.MTCS DEBUG: Wait for MTMount azimuth in position event.
setup.MTCS DEBUG: MTMount azimuth in position: True.
setup.MTCS DEBUG: MTMount azimuth already in position. Handling potential r
ace condition.
setup.MTCS DEBUG: Mount target: private_revCode: bdcb00ba, private_sndStam
p: 1655767893.0973513, private_rcvStamp: 1655767893.0976253, private_seqNu
m: 11302, private_identity: MTMount, private_origin: 44621, elevation: 85.3
8998260710547, elevationVelocity: -0.0006998842014484489, azimuth: 191.1822
5216295085, azimuthVelocity: 0.04179831422519418, taiTime: 1655767893.15633
6, trackId: 1, tracksys: SIDEREAL, radesys: ICRS, priority: 0
setup.MTCS INFO: MTMount elevation in position: False.
setup.MTCS INFO: MTMount azimuth in position: False.
```

```
setup.MTCS INFO: MTMount elevation in position: True.
setup.MTCS DEBUG: MTMount elevation in position True. Waiting settle time
3.0s
setup.MTCS DEBUG: [Tel]: Az = +190.501[ +0.7]; El = +085.399[ -0.0] [Ro
t]: -000.100[ -0.0] [Dome] Az = +000.000; El = +000.000
setup.MTCS DEBUG: Dome azimuth in position.
setup.MTCS DEBUG: Dome elevation in position.
setup.MTCS INFO: MTRotator in position: False.
setup.MTCS INFO: MTRotator in position: True.
setup.MTCS DEBUG: MTRotator in position True. Waiting settle time 3.0s
setup.MTCS INFO: MTMount azimuth in position: True.
setup.MTCS DEBUG: MTMount azimuth in position True. Waiting settle time 3.0
s
setup.MTCS DEBUG: Stop tracking.
MTHexapod.electrical ERROR: tel_electrical DDS read queue is full (100 elem
ents); data may be lost
MTM1M3.powerSupplyData ERROR: tel_powerSupplyData DDS read queue is full (1
00 elements); data may be lost
MTHexapod.electrical ERROR: tel_electrical DDS read queue is full (100 elem
ents); data may be lost
MTMount.elevation ERROR: tel_elevation DDS read queue is full (100 element
s); data may be lost
MTRotator.rotation ERROR: tel_rotation DDS read queue is full (100 element
s); data may be lost
MTPtg.timeAndDate ERROR: tel_timeAndDate DDS read queue is full (100 elemen
ts); data may be lost
MTMount.cameraCableWrap ERROR: tel_cameraCableWrap DDS read queue is full
(100 elements); data may be lost
MTHexapod.application ERROR: tel_application DDS read queue is full (100 el
ements); data may be lost
MTHexapod.application ERROR: tel_application DDS read queue is full (100 el
ements); data may be lost
MTM2.tangentEncoderPositions ERROR: tel_tangentEncoderPositions DDS read qu
eue is full (100 elements); data may be lost
MTHexapod.actuators ERROR: tel_actuators DDS read queue is full (100 elemen
ts); data may be lost
MTPtg.mountStatus ERROR: tel_mountStatus DDS read queue is full (100 elemen
ts); data may be lost
MTMount.azimuth ERROR: tel_azimuth DDS read queue is full (100 elements); d
ata may be lost
MTM2.powerStatus ERROR: tel_powerStatus DDS read queue is full (100 element
s); data may be lost
MTRotator.motors ERROR: tel_motors DDS read queue is full (100 elements); d
ata may be lost
MTM1M3.pidData ERROR: tel_pidData DDS read queue is full (100 elements); da
ta may be lost
MTDome.azimuth ERROR: tel_azimuth DDS read queue is full (100 elements); da
ta may be lost
MTPtg.mountPosition ERROR: tel_mountPosition DDS read queue is full (100 el
ements); data may be lost
MTM2.positionIMS ERROR: tel_positionIMS DDS read queue is full (100 element
s); data may be lost
```

```

| MTPtg.currentTargetStatus ERROR: tel_currentTargetStatus DDS read queue is
|   full (100 elements); data may be lost
| MTHexapod.actuators ERROR: tel_actuators DDS read queue is full (100 elemen
| ts); data may be lost
| MTHexapod.logevent_heartbeat WARNING: evt_heartbeat DDS read queue is filli
| ng: 40 of 100 elements
| MTRotator.electrical ERROR: tel_electrical DDS read queue is full (100 elem
| ents); data may be lost
| MTDome.logevent_azMotion ERROR: evt_azMotion DDS read queue is full (100 el
| ements); data may be lost
| MTM2.position ERROR: tel_position DDS read queue is full (100 elements); da
| ta may be lost
| MTHexapod.logevent_heartbeat WARNING: evt_heartbeat DDS read queue is filli
| ng: 39 of 100 elements
| MTRotator.ccwFollowingError ERROR: tel_ccwFollowingError DDS read queue is
|   full (100 elements); data may be lost
| MTMount.logevent_target ERROR: evt_target DDS read queue is full (100 eleme
| nts); data may be lost
| MTRotator.logevent_target ERROR: evt_target DDS read queue is full (100 ele
| ments); data may be lost
| MTM2.netMomentsTotal ERROR: tel_netMomentsTotal DDS read queue is full (100
| elements); data may be lost
| MTM1M3.outerLoopData ERROR: tel_outerLoopData DDS read queue is full (100 e
| lements); data may be lost
| MTMount.logevent_cameraCableWrapTarget ERROR: evt_cameraCableWrapTarget DDS
|   read queue is full (100 elements); data may be lost
| MTM2.netForcesTotal ERROR: tel_netForcesTotal DDS read queue is full (100 e
| lements); data may be lost

```

```

In [31]: az, el = await moveMountInElevationSteps(84.4, azimuth=190.5)

print('Tracking second source')
target = mtcs.radec_from_azel(az=az, el=el)
await mtcs.slew_icrs(ra=target.ra, dec=target.dec, rot_type=RotType.Physical, r
time.sleep(39.)
await mtcs.stop_tracking()

Moving elevation to 85.36 deg
MTM2.ilcData ERROR: tel_ilcData DDS read queue is full (100 elements); data
may be lost
MTM2.forceBalance ERROR: tel_forceBalance DDS read queue is full (100 elemen
nts); data may be lost
MTM1M3.inclinometerData ERROR: tel_inclinometerData DDS read queue is full
(100 elements); data may be lost
MTM1M3.imsData ERROR: tel_imsData DDS read queue is full (100 elements); da
ta may be lost
MTM2.displacementSensors ERROR: tel_displacementSensors DDS read queue is f
ull (100 elements); data may be lost
MTM2.axialEncoderPositions ERROR: tel_axialEncoderPositions DDS read queue
is full (100 elements); data may be lost
MTM1M3.hardpointMonitorData ERROR: tel_hardpointMonitorData DDS read queue
is full (100 elements); data may be lost

```

```
MTM1M3.hardpointActuatorData ERROR: tel_hardpointActuatorData DDS read queue is full (100 elements); data may be lost
MTM1M3.forceActuatorData ERROR: tel_forceActuatorData DDS read queue is full (100 elements); data may be lost
MTM1M3.accelerometerData ERROR: tel_accelerometerData DDS read queue is full (100 elements); data may be lost
MTM1M3.logevent_forceActuatorWarning ERROR: evt_forceActuatorWarning DDS read queue is full (100 elements); data may be lost
MTM1M3.logevent_appliedThermalForces ERROR: evt_appliedThermalForces DDS read queue is full (100 elements); data may be lost
MTM1M3.logevent_appliedStaticForces ERROR: evt_appliedStaticForces DDS read queue is full (100 elements); data may be lost
MTM1M3.logevent_appliedForces ERROR: evt_appliedForces DDS read queue is full (100 elements); data may be lost
MTM1M3.logevent_appliedElevationForces ERROR: evt_appliedElevationForces DDS read queue is full (100 elements); data may be lost
MTM1M3.logevent_appliedCylinderForces ERROR: evt_appliedCylinderForces DDS read queue is full (100 elements); data may be lost
MTM1M3.logevent_appliedBalanceForces ERROR: evt_appliedBalanceForces DDS read queue is full (100 elements); data may be lost
MTM1M3.logevent_appliedAzimuthForces ERROR: evt_appliedAzimuthForces DDS read queue is full (100 elements); data may be lost
MTM1M3.logevent_appliedActiveOpticForces ERROR: evt_appliedActiveOpticForces DDS read queue is full (100 elements); data may be lost
MTM1M3.logevent_appliedAberrationForces ERROR: evt_appliedAberrationForces DDS read queue is full (100 elements); data may be lost
Moving elevation to 85.04 deg
MTHexapod.electrical WARNING: tel_electrical DDS read queue is filling: 20 of 100 elements
MTHexapod.electrical WARNING: tel_electrical DDS read queue is filling: 10 of 100 elements
MTHexapod.application WARNING: tel_application DDS read queue is filling: 20 of 100 elements
MTHexapod.application WARNING: tel_application DDS read queue is filling: 10 of 100 elements
MTHexapod.actuators WARNING: tel_actuators DDS read queue is filling: 19 of 100 elements
Moving elevation to 84.72 deg
MTHexapod.electrical WARNING: tel_electrical DDS read queue is filling: 20 of 100 elements
MTHexapod.electrical WARNING: tel_electrical DDS read queue is filling: 10 of 100 elements
MTHexapod.application WARNING: tel_application DDS read queue is filling: 20 of 100 elements
MTHexapod.application WARNING: tel_application DDS read queue is filling: 10 of 100 elements
MTHexapod.actuators WARNING: tel_actuators DDS read queue is filling: 19 of 100 elements
MTHexapod.actuators WARNING: tel_actuators DDS read queue is filling: 10 of 100 elements
Moving elevation to 84.40 deg
MTHexapod.electrical WARNING: tel_electrical DDS read queue is filling: 10 of 100 elements
```

```
MTHexapod.electrical WARNING: tel_electrical DDS read queue is filling: 20
of 100 elements
MTHexapod.application WARNING: tel_application DDS read queue is filling: 1
0 of 100 elements
MTHexapod.application WARNING: tel_application DDS read queue is filling: 2
0 of 100 elements
MTHexapod.actuators WARNING: tel_actuators DDS read queue is filling: 20 of
100 elements
Tracking second source
setup.MTCS DEBUG: Setting rotator to physical fixed position 0.0 deg. Rotat
or will not track.
MTHexapod.electrical WARNING: tel_electrical DDS read queue is filling: 10
of 100 elements
MTHexapod.electrical WARNING: tel_electrical DDS read queue is filling: 21
of 100 elements
MTHexapod.application WARNING: tel_application DDS read queue is filling: 1
0 of 100 elements
MTHexapod.application WARNING: tel_application DDS read queue is filling: 2
1 of 100 elements
MTHexapod.actuators WARNING: tel_actuators DDS read queue is filling: 20 of
100 elements
setup.MTCS DEBUG: Wait 5.0s for rotator to settle down.
setup.MTCS DEBUG: Workaround for rotator trajectory problem. Moving rotator
to its current position: -0.10
setup.MTCS DEBUG: Wait for MTRotator in position event.
setup.MTCS DEBUG: MTRotator in position: False.
setup.MTCS INFO: MTRotator in position: True.
setup.MTCS DEBUG: MTRotator in position True. Waiting settle time 5.0s
setup.MTCS DEBUG: Sending slew command.
setup.MTCS DEBUG: Scheduling check coroutines
setup.MTCS DEBUG: process as completed...
setup.MTCS DEBUG: Monitor position started.
setup.MTCS DEBUG: Waiting for Target event from mtmount.
setup.MTCS DEBUG: mtmount: <State.ENABLED: 2>
setup.MTCS DEBUG: mtptg: <State.ENABLED: 2>
setup.MTCS DEBUG: mtaos: <State.ENABLED: 2>
setup.MTCS DEBUG: mtm1m3: <State.ENABLED: 2>
setup.MTCS DEBUG: mtm2: <State.ENABLED: 2>
setup.MTCS DEBUG: mthexapod_1: <State.ENABLED: 2>
setup.MTCS DEBUG: mthexapod_2: <State.ENABLED: 2>
setup.MTCS DEBUG: mtrotator: <State.ENABLED: 2>
setup.MTCS DEBUG: mt dome: <State.ENABLED: 2>
setup.MTCS DEBUG: mt dome trajectory: <State.ENABLED: 2>
setup.MTCS DEBUG: Wait for mtmount in position events.
setup.MTCS DEBUG: Wait for dome in position event.
setup.MTCS DEBUG: Wait for MTRotator in position event.
setup.MTCS DEBUG: MTRotator in position: True.
setup.MTCS DEBUG: MTRotator already in position. Handling potential race co
ndition.
setup.MTCS DEBUG: Wait for MTMount elevation in position event.
setup.MTCS DEBUG: MTMount elevation in position: True.
```

```
setup.MTCS DEBUG: MTMount elevation already in position. Handling potential race condition.
setup.MTCS DEBUG: Wait for MTMount azimuth in position event.
setup.MTCS DEBUG: MTMount azimuth in position: True.
setup.MTCS DEBUG: MTMount azimuth already in position. Handling potential race condition.
setup.MTCS DEBUG: Mount target: private_revCode: bdcb00ba, private_sndStamp: 1655767958.68094, private_rcvStamp: 1655767958.6811903, private_seqNum: 12157, private_identity: MTMount, private_origin: 44621, elevation: 84.39109505431064, elevationVelocity: -0.0006894082185977359, azimuth: 191.0129506176333, azimuthVelocity: 0.033963091412757225, taiTime: 1655767958.7402027, trackId: 2, tracksys: SIDEREAL, radesys: ICRS, priority: 0
setup.MTCS INFO: MTMount elevation in position: False.
setup.MTCS INFO: MTMount azimuth in position: False.
setup.MTCS INFO: MTMount elevation in position: True.
setup.MTCS DEBUG: MTMount elevation in position True. Waiting settle time 3.0s
setup.MTCS INFO: MTRotator in position: False.
setup.MTCS INFO: MTMount azimuth in position: True.
setup.MTCS DEBUG: MTMount azimuth in position True. Waiting settle time 3.0s
setup.MTCS INFO: MTRotator in position: True.
setup.MTCS DEBUG: MTRotator in position True. Waiting settle time 3.0s
setup.MTCS DEBUG: [Tel]: Az = +190.504[ +0.5]; El = +084.398[ -0.0] [Rot]: -000.100[ +0.0] [Dome] Az = +000.000; El = +000.000
setup.MTCS DEBUG: Dome azimuth in position.
setup.MTCS DEBUG: Dome elevation in position.
setup.MTCS DEBUG: Stop tracking.
MTM1M3.powerSupplyData ERROR: tel_powerSupplyData DDS read queue is full (100 elements); data may be lost
MTMount.elevation ERROR: tel_elevation DDS read queue is full (100 elements); data may be lost
MTHexapod.electrical ERROR: tel_electrical DDS read queue is full (100 elements); data may be lost
MTPtg.timeAndDate ERROR: tel_timeAndDate DDS read queue is full (100 elements); data may be lost
MTRotator.rotation ERROR: tel_rotation DDS read queue is full (100 elements); data may be lost
MTHexapod.electrical ERROR: tel_electrical DDS read queue is full (100 elements); data may be lost
MTMount.cameraCableWrap ERROR: tel_cameraCableWrap DDS read queue is full (100 elements); data may be lost
MTHexapod.application ERROR: tel_application DDS read queue is full (100 elements); data may be lost
MTHexapod.actuators ERROR: tel_actuators DDS read queue is full (100 elements); data may be lost
MTMount.azimuth ERROR: tel_azimuth DDS read queue is full (100 elements); data may be lost
MTHexapod.application ERROR: tel_application DDS read queue is full (100 elements); data may be lost
MTM2.tangentEncoderPositions ERROR: tel_tangentEncoderPositions DDS read queue is full (100 elements); data may be lost
```

```

MTRotator.motors ERROR: tel_motors DDS read queue is full (100 elements); data may be lost
MTM1M3.pidData ERROR: tel_pidData DDS read queue is full (100 elements); data may be lost
MTM2.powerStatus ERROR: tel_powerStatus DDS read queue is full (100 elements); data may be lost
MTDome.azimuth ERROR: tel_azimuth DDS read queue is full (100 elements); data may be lost
MTPtg.mountStatus ERROR: tel_mountStatus DDS read queue is full (100 elements); data may be lost
MTM2.positionIMS ERROR: tel_positionIMS DDS read queue is full (100 elements); data may be lost
MTRotator.electrical ERROR: tel_electrical DDS read queue is full (100 elements); data may be lost
MTHexapod.logevent_heartbeat WARNING: evt_heartbeat DDS read queue is filling: 39 of 100 elements
MTPtg.mountPosition ERROR: tel_mountPosition DDS read queue is full (100 elements); data may be lost
MTHexapod.actuators ERROR: tel_actuators DDS read queue is full (100 elements); data may be lost
MTM2.position ERROR: tel_position DDS read queue is full (100 elements); data may be lost
MTDome.logevent_azMotion ERROR: evt_azMotion DDS read queue is full (100 elements); data may be lost
MTPtg.currentTargetStatus ERROR: tel_currentTargetStatus DDS read queue is full (100 elements); data may be lost
MTMount.logevent_target ERROR: evt_target DDS read queue is full (100 elements); data may be lost
MTHexapod.logevent_heartbeat WARNING: evt_heartbeat DDS read queue is filling: 39 of 100 elements
MTM2.netMomentsTotal ERROR: tel_netMomentsTotal DDS read queue is full (100 elements); data may be lost
MTRotator.ccwFollowingError ERROR: tel_ccwFollowingError DDS read queue is full (100 elements); data may be lost
MTM2.netForcesTotal ERROR: tel_netForcesTotal DDS read queue is full (100 elements); data may be lost
MTMount.logevent_cameraCableWrapTarget ERROR: evt_cameraCableWrapTarget DDS read queue is full (100 elements); data may be lost
MTRotator.logevent_target ERROR: evt_target DDS read queue is full (100 elements); data may be lost
MTM2.ilcData ERROR: tel_ilcData DDS read queue is full (100 elements); data may be lost
MTM1M3.outerLoopData ERROR: tel_outerLoopData DDS read queue is full (100 elements); data may be lost
MTM2.forceBalance ERROR: tel_forceBalance DDS read queue is full (100 elements); data may be lost
MTM1M3.inclinometerData ERROR: tel_inclinometerData DDS read queue is full (100 elements); data may be lost

```

```

In [32]: az, el = await moveMountInElevationSteps(83.4, azimuth=190.5)

print('Tracking second source')
target = mtcs.radec_from_azel(az=az, el=el)

```

```
await mtcs.slew_icrs(ra=target.ra, dec=target.dec, rot_type=RotType.Physical, r
time.sleep(39.)
await mtcs.stop_tracking()

Moving elevation to 84.36 deg
MTM1M3.imsData ERROR: tel_imsData DDS read queue is full (100 elements); da
ta may be lost
MTM2.displacementSensors ERROR: tel_displacementSensors DDS read queue is f
ull (100 elements); data may be lost
MTM2.axialEncoderPositions ERROR: tel_axialEncoderPositions DDS read queue
is full (100 elements); data may be lost
MTM1M3.hardpointMonitorData ERROR: tel_hardpointMonitorData DDS read queue
is full (100 elements); data may be lost
MTM1M3.hardpointActuatorData ERROR: tel_hardpointActuatorData DDS read que
ue is full (100 elements); data may be lost
MTM1M3.forceActuatorData ERROR: tel_forceActuatorData DDS read queue is ful
l (100 elements); data may be lost
MTM1M3.accelerometerData ERROR: tel_accelerometerData DDS read queue is ful
l (100 elements); data may be lost
MTM1M3.logevent_forceActuatorWarning ERROR: evt_forceActuatorWarning DDS re
ad queue is full (100 elements); data may be lost
MTM1M3.logevent_appliedThermalForces ERROR: evt_appliedThermalForces DDS re
ad queue is full (100 elements); data may be lost
MTM1M3.logevent_appliedStaticForces ERROR: evt_appliedStaticForces DDS read
queue is full (100 elements); data may be lost
MTM1M3.logevent_appliedForces ERROR: evt_appliedForces DDS read queue is fu
ll (100 elements); data may be lost
MTM1M3.logevent_appliedElevationForces ERROR: evt_appliedElevationForces DD
S read queue is full (100 elements); data may be lost
MTM1M3.logevent_appliedCylinderForces ERROR: evt_appliedCylinderForces DDS
read queue is full (100 elements); data may be lost
MTM1M3.logevent_appliedBalanceForces ERROR: evt_appliedBalanceForces DDS re
ad queue is full (100 elements); data may be lost
MTM1M3.logevent_appliedAzimuthForces ERROR: evt_appliedAzimuthForces DDS re
ad queue is full (100 elements); data may be lost
MTM1M3.logevent_appliedActiveOpticForces ERROR: evt_appliedActiveOpticForce
s DDS read queue is full (100 elements); data may be lost
MTM1M3.logevent_appliedAberrationForces ERROR: evt_appliedAberrationForces
DDS read queue is full (100 elements); data may be lost

Moving elevation to 84.04 deg
MTHexapod.electrical WARNING: tel_electrical DDS read queue is filling: 20
of 100 elements
MTHexapod.electrical WARNING: tel_electrical DDS read queue is filling: 10
of 100 elements
MTHexapod.application WARNING: tel_application DDS read queue is filling: 2
0 of 100 elements
MTHexapod.application WARNING: tel_application DDS read queue is filling: 1
0 of 100 elements
MTHexapod.actuators WARNING: tel_actuators DDS read queue is filling: 20 of
100 elements

Moving elevation to 83.72 deg
MTHexapod.electrical WARNING: tel_electrical DDS read queue is filling: 20
of 100 elements
```

```
MTHexapod.electrical WARNING: tel_electrical DDS read queue is filling: 10  
of 100 elements  
MTHexapod.application WARNING: tel_application DDS read queue is filling: 1  
0 of 100 elements  
MTHexapod.application WARNING: tel_application DDS read queue is filling: 2  
1 of 100 elements  
MTHexapod.actuators WARNING: tel_actuators DDS read queue is filling: 20 of  
100 elements  
MTHexapod.actuators WARNING: tel_actuators DDS read queue is filling: 10 of  
100 elements  
Moving elevation to 83.40 deg  
MTHexapod.electrical WARNING: tel_electrical DDS read queue is filling: 20  
of 100 elements  
MTHexapod.electrical WARNING: tel_electrical DDS read queue is filling: 10  
of 100 elements  
MTHexapod.application WARNING: tel_application DDS read queue is filling: 2  
0 of 100 elements  
MTHexapod.application WARNING: tel_application DDS read queue is filling: 1  
0 of 100 elements  
MTHexapod.actuators WARNING: tel_actuators DDS read queue is filling: 19 of  
100 elements  
Tracking second source  
setup.MTCS DEBUG: Setting rotator to physical fixed position 0.0 deg. Rotat  
or will not track.  
MTHexapod.electrical WARNING: tel_electrical DDS read queue is filling: 10  
of 100 elements  
MTHexapod.electrical WARNING: tel_electrical DDS read queue is filling: 20  
of 100 elements  
MTHexapod.application WARNING: tel_application DDS read queue is filling: 1  
1 of 100 elements  
MTHexapod.application WARNING: tel_application DDS read queue is filling: 2  
1 of 100 elements  
MTHexapod.actuators WARNING: tel_actuators DDS read queue is filling: 10 of  
100 elements  
MTHexapod.actuators WARNING: tel_actuators DDS read queue is filling: 20 of  
100 elements  
setup.MTCS DEBUG: Wait 5.0s for rotator to settle down.  
setup.MTCS DEBUG: Workaround for rotator trajectory problem. Moving rotator  
to its current position: 0.10  
setup.MTCS DEBUG: Wait for MTRotator in position event.  
setup.MTCS DEBUG: MTRotator in position: True.  
setup.MTCS DEBUG: MTRotator already in position. Handling potential race co  
ndition.  
setup.MTCS INFO: MTRotator in position: False.  
setup.MTCS INFO: MTRotator in position: True.  
setup.MTCS DEBUG: MTRotator in position True. Waiting settle time 5.0s  
setup.MTCS DEBUG: Sending slew command.  
setup.MTCS DEBUG: Scheduling check routines  
setup.MTCS DEBUG: process as completed...  
setup.MTCS DEBUG: Monitor position started.  
setup.MTCS DEBUG: Waiting for Target event from mtmount.  
setup.MTCS DEBUG: mtmount: <State.ENABLED: 2>
```

```
setup.MTCS DEBUG: mtptg: <State.ENABLED: 2>
setup.MTCS DEBUG: mtaos: <State.ENABLED: 2>
setup.MTCS DEBUG: mtm1m3: <State.ENABLED: 2>
setup.MTCS DEBUG: mtm2: <State.ENABLED: 2>
setup.MTCS DEBUG: mthexapod_1: <State.ENABLED: 2>
setup.MTCS DEBUG: mthexapod_2: <State.ENABLED: 2>
setup.MTCS DEBUG: mtrotator: <State.ENABLED: 2>
setup.MTCS DEBUG: mt dome: <State.ENABLED: 2>
setup.MTCS DEBUG: mt dometrajectory: <State.ENABLED: 2>
setup.MTCS DEBUG: Wait for mtmount in position events.
setup.MTCS DEBUG: Wait for dome in position event.
setup.MTCS DEBUG: Wait for MTRotator in position event.
setup.MTCS DEBUG: MTRotator in position: True.
setup.MTCS DEBUG: MTRotator already in position. Handling potential race condition.
setup.MTCS DEBUG: Wait for MTMount elevation in position event.
setup.MTCS DEBUG: MTMount elevation in position: True.
setup.MTCS DEBUG: MTMount elevation already in position. Handling potential race condition.
setup.MTCS DEBUG: Wait for MTMount azimuth in position event.
setup.MTCS DEBUG: MTMount azimuth in position: True.
setup.MTCS DEBUG: MTMount azimuth already in position. Handling potential race condition.
setup.MTCS DEBUG: Mount target: private_revCode: bdcb00ba, private_sndStamp: 1655768024.5647604, private_rcvStamp: 1655768024.5650501, private_seqNum: 13011, private_identity: MTMount, private_origin: 44621, elevation: 83.39101880348731, elevationVelocity: -0.0006851170614272634, azimuth: 190.9436918439873, azimuthVelocity: 0.02847433715879528, taiTime: 1655768024.6239274, trackId: 3, tracksys: SIDEREAL, radesys: ICRS, priority: 0
setup.MTCS INFO: MTMount elevation in position: False.
setup.MTCS INFO: MTMount azimuth in position: False.
setup.MTCS INFO: MTMount elevation in position: True.
setup.MTCS DEBUG: MTMount elevation in position True. Waiting settle time 3.0s
setup.MTCS INFO: MTRotator in position: False.
setup.MTCS INFO: MTMount azimuth in position: True.
setup.MTCS DEBUG: MTMount azimuth in position True. Waiting settle time 3.0s
setup.MTCS INFO: MTRotator in position: True.
setup.MTCS DEBUG: MTRotator in position True. Waiting settle time 3.0s
setup.MTCS DEBUG: [Tel]: Az = +190.507[ +0.4]; El = +083.397[ -0.0] [Rot]: +000.100[ -0.0] [Dome] Az = +000.000; El = +000.000
setup.MTCS DEBUG: Dome azimuth in position.
setup.MTCS DEBUG: Dome elevation in position.
setup.MTCS DEBUG: Stop tracking.
MTM1M3.powerSupplyData ERROR: tel_powerSupplyData DDS read queue is full (100 elements); data may be lost
MTMount.elevation ERROR: tel_elevation DDS read queue is full (100 elements); data may be lost
MTHexapod.electrical ERROR: tel_electrical DDS read queue is full (100 elements); data may be lost
```

```
MTPtg.timeAndDate ERROR: tel_timeAndDate DDS read queue is full (100 elements); data may be lost
MTHexapod.electrical ERROR: tel_electrical DDS read queue is full (100 elements); data may be lost
MTRotator.rotation ERROR: tel_rotation DDS read queue is full (100 elements); data may be lost
MTHexapod.application ERROR: tel_application DDS read queue is full (100 elements); data may be lost
MTRotator.motors ERROR: tel_motors DDS read queue is full (100 elements); data may be lost
MTM1M3.pidData ERROR: tel_pidData DDS read queue is full (100 elements); data may be lost
MTMount.cameraCableWrap ERROR: tel_cameraCableWrap DDS read queue is full (100 elements); data may be lost
MTHexapod.actuators ERROR: tel_actuators DDS read queue is full (100 elements); data may be lost
MTM2.tangentEncoderPositions ERROR: tel_tangentEncoderPositions DDS read queue is full (100 elements); data may be lost
MTDome.azimuth ERROR: tel_azimuth DDS read queue is full (100 elements); data may be lost
MTHexapod.application ERROR: tel_application DDS read queue is full (100 elements); data may be lost
MTM2.powerStatus ERROR: tel_powerStatus DDS read queue is full (100 elements); data may be lost
MTRotator.electrical ERROR: tel_electrical DDS read queue is full (100 elements); data may be lost
MTPtg.mountStatus ERROR: tel_mountStatus DDS read queue is full (100 elements); data may be lost
MTMount.azimuth ERROR: tel_azimuth DDS read queue is full (100 elements); data may be lost
MTHexapod.logevent_heartbeat WARNING: evt_heartbeat DDS read queue is filling: 39 of 100 elements
MTM2.positionIMS ERROR: tel_positionIMS DDS read queue is full (100 elements); data may be lost
MTPtg.mountPosition ERROR: tel_mountPosition DDS read queue is full (100 elements); data may be lost
MTM2.position ERROR: tel_position DDS read queue is full (100 elements); data may be lost
MTDome.logevent_azMotion ERROR: evt_azMotion DDS read queue is full (100 elements); data may be lost
MTHexapod.actuators ERROR: tel_actuators DDS read queue is full (100 elements); data may be lost
MTPtg.currentTargetStatus ERROR: tel_currentTargetStatus DDS read queue is full (100 elements); data may be lost
MTM2.netMomentsTotal ERROR: tel_netMomentsTotal DDS read queue is full (100 elements); data may be lost
MTMount.logevent_target ERROR: evt_target DDS read queue is full (100 elements); data may be lost
MTHexapod.logevent_heartbeat WARNING: evt_heartbeat DDS read queue is filling: 40 of 100 elements
MTRotator.ccwFollowingError ERROR: tel_ccwFollowingError DDS read queue is full (100 elements); data may be lost
```

```

MTM1M3.outerLoopData ERROR: tel_outerLoopData DDS read queue is full (100 elements); data may be lost
MTRotator.logevent_target ERROR: evt_target DDS read queue is full (100 elements); data may be lost
MTMount.logevent_cameraCableWrapTarget ERROR: evt_cameraCableWrapTarget DDS read queue is full (100 elements); data may be lost
MTM2.netForcesTotal ERROR: tel_netForcesTotal DDS read queue is full (100 elements); data may be lost
MTM1M3.inclinometerData ERROR: tel_inclinometerData DDS read queue is full (100 elements); data may be lost
MTM2.ilcData ERROR: tel_ilcData DDS read queue is full (100 elements); data may be lost

```

In [33]:

```

az, el = await moveMountInElevationSteps(82.4, azimuth=190.5)

print('Tracking second source')
target = mtcs.radec_from_azel(az=az, el=el)
await mtcs.slew_icrs(ra=target.ra, dec=target.dec, rot_type=RotType.Physical, r
time.sleep(39.)
await mtcs.stop_tracking()

```

Moving elevation to 83.36 deg

```

MTM2.forceBalance ERROR: tel_forceBalance DDS read queue is full (100 elements); data may be lost
MTM1M3.imsData ERROR: tel_imsData DDS read queue is full (100 elements); data may be lost
MTM1M3.hardpointMonitorData ERROR: tel_hardpointMonitorData DDS read queue is full (100 elements); data may be lost
MTM2.displacementSensors ERROR: tel_displacementSensors DDS read queue is full (100 elements); data may be lost
MTM2.axialEncoderPositions ERROR: tel_axialEncoderPositions DDS read queue is full (100 elements); data may be lost
MTM1M3.hardpointActuatorData ERROR: tel_hardpointActuatorData DDS read queue is full (100 elements); data may be lost
MTM1M3.forceActuatorData ERROR: tel_forceActuatorData DDS read queue is full (100 elements); data may be lost
MTM1M3.accelerometerData ERROR: tel_accelerometerData DDS read queue is full (100 elements); data may be lost
MTM1M3.logevent_forceActuatorWarning ERROR: evt_forceActuatorWarning DDS read queue is full (100 elements); data may be lost
MTM1M3.logevent_appliedThermalForces ERROR: evt_appliedThermalForces DDS read queue is full (100 elements); data may be lost
MTM1M3.logevent_appliedStaticForces ERROR: evt_appliedStaticForces DDS read queue is full (100 elements); data may be lost
MTM1M3.logevent_appliedForces ERROR: evt_appliedForces DDS read queue is full (100 elements); data may be lost
MTM1M3.logevent_appliedElevationForces ERROR: evt_appliedElevationForces DDS read queue is full (100 elements); data may be lost
MTM1M3.logevent_appliedCylinderForces ERROR: evt_appliedCylinderForces DDS read queue is full (100 elements); data may be lost
MTM1M3.logevent_appliedBalanceForces ERROR: evt_appliedBalanceForces DDS read queue is full (100 elements); data may be lost

```

```
MTM1M3.logevent_appliedAzimuthForces ERROR: evt_appliedAzimuthForces DDS re  
ad queue is full (100 elements); data may be lost  
MTM1M3.logevent_appliedActiveOpticForces ERROR: evt_appliedActiveOpticForces DDS read queue is full (100 elements); data may be lost  
MTM1M3.logevent_appliedAberrationForces ERROR: evt_appliedAberrationForces DDS read queue is full (100 elements); data may be lost  
Moving elevation to 83.04 deg  
MTHexapod.electrical WARNING: tel_electrical DDS read queue is filling: 20 of 100 elements  
MTHexapod.electrical WARNING: tel_electrical DDS read queue is filling: 10 of 100 elements  
MTHexapod.application WARNING: tel_application DDS read queue is filling: 1 0 of 100 elements  
MTHexapod.application WARNING: tel_application DDS read queue is filling: 2 1 of 100 elements  
MTHexapod.actuators WARNING: tel_actuators DDS read queue is filling: 20 of 100 elements  
Moving elevation to 82.72 deg  
MTHexapod.electrical WARNING: tel_electrical DDS read queue is filling: 21 of 100 elements  
MTHexapod.electrical WARNING: tel_electrical DDS read queue is filling: 10 of 100 elements  
MTHexapod.application WARNING: tel_application DDS read queue is filling: 2 1 of 100 elements  
MTHexapod.application WARNING: tel_application DDS read queue is filling: 1 0 of 100 elements  
MTHexapod.actuators WARNING: tel_actuators DDS read queue is filling: 20 of 100 elements  
Moving elevation to 82.40 deg  
MTHexapod.electrical WARNING: tel_electrical DDS read queue is filling: 10 of 100 elements  
MTHexapod.electrical WARNING: tel_electrical DDS read queue is filling: 20 of 100 elements  
MTHexapod.application WARNING: tel_application DDS read queue is filling: 1 0 of 100 elements  
MTHexapod.application WARNING: tel_application DDS read queue is filling: 2 0 of 100 elements  
MTHexapod.actuators WARNING: tel_actuators DDS read queue is filling: 19 of 100 elements  
MTHexapod.actuators WARNING: tel_actuators DDS read queue is filling: 10 of 100 elements  
Tracking second source  
setup.MTCS DEBUG: Setting rotator to physical fixed position 0.0 deg. Rotator will not track.  
MTHexapod.electrical WARNING: tel_electrical DDS read queue is filling: 20 of 100 elements  
MTHexapod.electrical WARNING: tel_electrical DDS read queue is filling: 10 of 100 elements  
MTHexapod.application WARNING: tel_application DDS read queue is filling: 2 0 of 100 elements  
MTHexapod.application WARNING: tel_application DDS read queue is filling: 1 0 of 100 elements
```

```
MTHexapod.actuators WARNING: tel_actuators DDS read queue is filling: 20 of
100 elements
setup.MTCS DEBUG: Wait 5.0s for rotator to settle down.
setup.MTCS DEBUG: Workaround for rotator trajectory problem. Moving rotator
to its current position: -0.10
setup.MTCS DEBUG: Wait for MTRotator in position event.
setup.MTCS DEBUG: MTRotator in position: True.
setup.MTCS DEBUG: MTRotator already in position. Handling potential race co
ndition.
setup.MTCS INFO: MTRotator in position: False.
setup.MTCS INFO: MTRotator in position: True.
setup.MTCS DEBUG: MTRotator in position True. Waiting settle time 5.0s
setup.MTCS DEBUG: Sending slew command.
setup.MTCS DEBUG: Scheduling check coroutines
setup.MTCS DEBUG: process as completed...
setup.MTCS DEBUG: Monitor position started.
setup.MTCS DEBUG: Waiting for Target event from mtmount.
setup.MTCS DEBUG: mtmount: <State.ENABLED: 2>
setup.MTCS DEBUG: mpttg: <State.ENABLED: 2>
setup.MTCS DEBUG: mtaos: <State.ENABLED: 2>
setup.MTCS DEBUG: mtm1m3: <State.ENABLED: 2>
setup.MTCS DEBUG: mtm2: <State.ENABLED: 2>
setup.MTCS DEBUG: mthexapod_1: <State.ENABLED: 2>
setup.MTCS DEBUG: mthexapod_2: <State.ENABLED: 2>
setup.MTCS DEBUG: mtrotator: <State.ENABLED: 2>
setup.MTCS DEBUG: mtdome: <State.ENABLED: 2>
setup.MTCS DEBUG: mtodometajectory: <State.ENABLED: 2>
setup.MTCS DEBUG: Wait for mtmount in position events.
setup.MTCS DEBUG: Wait for dome in position event.
setup.MTCS DEBUG: Wait for MTRotator in position event.
setup.MTCS DEBUG: MTRotator in position: True.
setup.MTCS DEBUG: MTRotator already in position. Handling potential race co
ndition.
setup.MTCS DEBUG: Wait for MTMount elevation in position event.
setup.MTCS DEBUG: MTMount elevation in position: True.
setup.MTCS DEBUG: MTMount elevation already in position. Handling potential
race condition.
setup.MTCS DEBUG: Wait for MTMount azimuth in position event.
setup.MTCS DEBUG: MTMount azimuth in position: True.
setup.MTCS DEBUG: MTMount azimuth already in position. Handling potential r
ace condition.
setup.MTCS DEBUG: Mount target: private_revCode: bdcb00ba, private_sndStam
p: 1655768091.300202, private_rcvStamp: 1655768091.300522, private_seqNum:
13865, private_identity: MTMount, private_origin: 44621, elevation: 82.390
78551128266, elevationVelocity: -0.0006822638191997919, azimuth: 190.897663
9276686, azimuthVelocity: 0.024420246427866502, taiTime: 1655768091.359261
8, trackId: 4, tracksys: SIDEREAL, radesys: ICRS, priority: 0
setup.MTCS INFO: MTMount elevation in position: False.
setup.MTCS INFO: MTMount azimuth in position: False.
setup.MTCS INFO: MTMount elevation in position: True.
```

```
setup.MTCS DEBUG: MTMount elevation in position True. Waiting settle time 3.0s
setup.MTCS INFO: MTRotator in position: False.
setup.MTCS INFO: MTMount azimuth in position: True.
setup.MTCS DEBUG: MTMount azimuth in position True. Waiting settle time 3.0s
setup.MTCS INFO: MTRotator in position: True.
setup.MTCS DEBUG: MTRotator in position True. Waiting settle time 3.0s
setup.MTCS DEBUG: [Tel]: Az = +190.505[ +0.4]; El = +082.397[ -0.0] [Rot]: -000.100[ -0.0] [Dome] Az = +000.000; El = +000.000
setup.MTCS DEBUG: Dome azimuth in position.
setup.MTCS DEBUG: Dome elevation in position.
setup.MTCS DEBUG: Stop tracking.
MTMount.elevation ERROR: tel_elevation DDS read queue is full (100 elements); data may be lost
MTM1M3.powerSupplyData ERROR: tel_powerSupplyData DDS read queue is full (100 elements); data may be lost
MTPtg.timeAndDate ERROR: tel_timeAndDate DDS read queue is full (100 elements); data may be lost
MTHexapod.electrical ERROR: tel_electrical DDS read queue is full (100 elements); data may be lost
MTHexapod.electrical ERROR: tel_electrical DDS read queue is full (100 elements); data may be lost
MTRotator.rotation ERROR: tel_rotation DDS read queue is full (100 elements); data may be lost
MTHexapod.application ERROR: tel_application DDS read queue is full (100 elements); data may be lost
MTMount.cameraCableWrap ERROR: tel_cameraCableWrap DDS read queue is full (100 elements); data may be lost
MTM1M3.pidData ERROR: tel_pidData DDS read queue is full (100 elements); data may be lost
MTHexapod.actuators ERROR: tel_actuators DDS read queue is full (100 elements); data may be lost
MTHexapod.application ERROR: tel_application DDS read queue is full (100 elements); data may be lost
MTM2.tangentEncoderPositions ERROR: tel_tangentEncoderPositions DDS read queue is full (100 elements); data may be lost
MTRotator.motors ERROR: tel_motors DDS read queue is full (100 elements); data may be lost
MTPtg.mountStatus ERROR: tel_mountStatus DDS read queue is full (100 elements); data may be lost
MTMount.azimuth ERROR: tel_azimuth DDS read queue is full (100 elements); data may be lost
MTDome.azimuth ERROR: tel_azimuth DDS read queue is full (100 elements); data may be lost
MTM2.powerStatus ERROR: tel_powerStatus DDS read queue is full (100 elements); data may be lost
MTPtg.mountPosition ERROR: tel_mountPosition DDS read queue is full (100 elements); data may be lost
MTMount.logevent_target ERROR: evt_target DDS read queue is full (100 elements); data may be lost
```

```
MTHexapod.actuators ERROR: tel_actuators DDS read queue is full (100 elements); data may be lost
MTPtg.currentTargetStatus ERROR: tel_currentTargetStatus DDS read queue is full (100 elements); data may be lost
MTHexapod.logevent_heartbeat WARNING: evt_heartbeat DDS read queue is filling: 39 of 100 elements
MTRotator.electrical ERROR: tel_electrical DDS read queue is full (100 elements); data may be lost
MTM2.positionIMS ERROR: tel_positionIMS DDS read queue is full (100 elements); data may be lost
MTHexapod.logevent_heartbeat WARNING: evt_heartbeat DDS read queue is filling: 39 of 100 elements
MTDome.logevent_azMotion ERROR: evt_azMotion DDS read queue is full (100 elements); data may be lost
MTRotator.ccwFollowingError ERROR: tel_ccwFollowingError DDS read queue is full (100 elements); data may be lost
MTM2.position ERROR: tel_position DDS read queue is full (100 elements); data may be lost
MTM2.netMomentsTotal ERROR: tel_netMomentsTotal DDS read queue is full (100 elements); data may be lost
MTM1M3.outerLoopData ERROR: tel_outerLoopData DDS read queue is full (100 elements); data may be lost
MTM2.netForcesTotal ERROR: tel_netForcesTotal DDS read queue is full (100 elements); data may be lost
MTMount.logevent_cameraCableWrapTarget ERROR: evt_cameraCableWrapTarget DDS read queue is full (100 elements); data may be lost
```

```
In [34]: t_end = Time(Time.now(), format='fits', scale='utc')

print(f"Gathering data - Elevation motion test - End time: {t_end}")
```

Gathering data - Elevation motion test - End time: 2022-06-20T23:34:57.198

```
In [36]: client = EfdClient("summit_efd")
```

```
MTHexapod.electrical WARNING: tel_electrical DDS read queue is filling: 22 of 100 elements
MTHexapod.electrical WARNING: tel_electrical DDS read queue is filling: 11 of 100 elements
MTHexapod.application WARNING: tel_application DDS read queue is filling: 23 of 100 elements
MTHexapod.application WARNING: tel_application DDS read queue is filling: 11 of 100 elements
MTHexapod.actuators WARNING: tel_actuators DDS read queue is filling: 10 of 100 elements
MTHexapod.actuators WARNING: tel_actuators DDS read queue is filling: 22 of 100 elements
```

```
In [37]: # Plot mount elevation as a function of time
# Query telemetry
dfm_elevation = await client.select_time_series('lsst.sal.MTMount.elevation', '
```

```
In [38]: # Plot
fig, axs = plt.subplots(figsize=(12, 6), sharex=True)
```

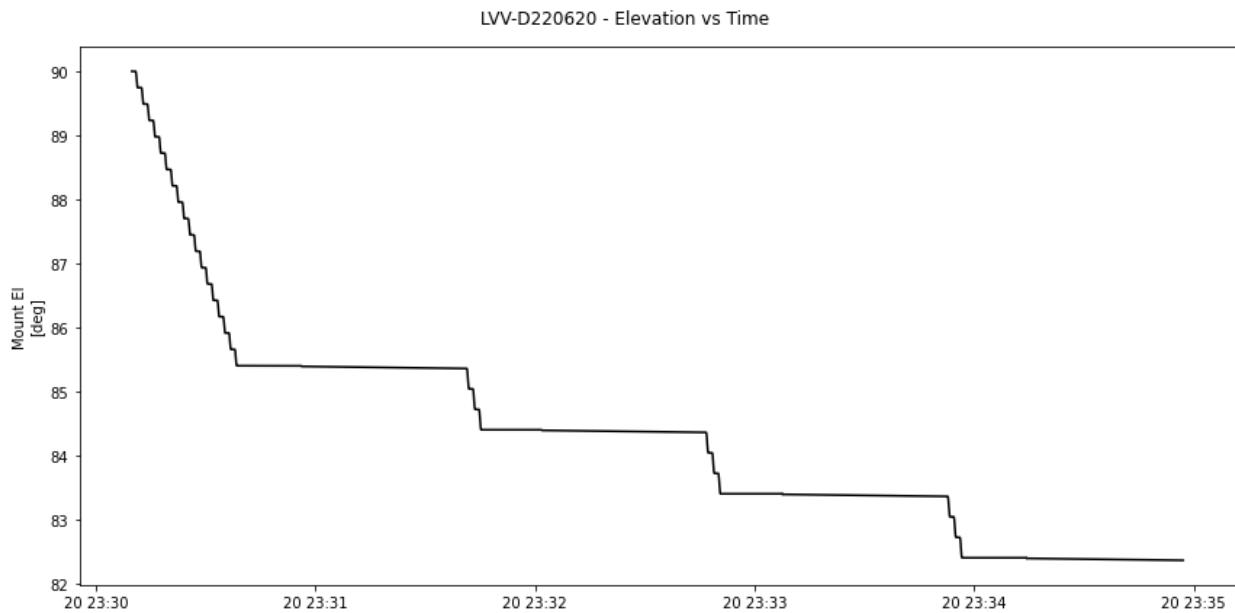
```

axs.plot(dfm_elevation["actualPosition"].dropna(), "k", label="Mount Elevation")
axs.set_ylabel("Mount El\n[n[deg]]")

fig.suptitle(f"{test_execution} - Elevation vs Time")
fig.tight_layout(h_pad=0.3)
fig.patch.set_facecolor('white')

fig.savefig(f"plots/{test_execution}_mount_el_vs_time.png")
plt.show()

```



## Get M1M3 Ready

- Raise the mirror,
- Turn on Balance Forces,
- Clear forces

Need to have M1M3 LUT use mount telemetry.

In [87]: `await mtcs.set_state(salobj.State.STANDBY, components=["mtm1m3"])`

```

| setup.MTCS DEBUG: [mtm1m3]::[<StateFAULT: 3>, <StateSTANDBY: 5>]
| setup.MTCS INFO: All components in <StateSTANDBY: 5>.

```

In [88]: `await mtcs.set_state(
 state=salobj.State.ENABLED,
 components=["mtm1m3"],
 overrides = {"mtm1m3": 'Default'}`

```

MTM1M3.logevent_forceActuatorForceWarning ERROR: evt_forceActuatorForceWarning DDS read queue is full (100 elements); data may be lost
setup.MTCS DEBUG: [mtm1m3]::[<StateSTANDBY: 5>, <StateDISABLED: 1>, <StateENABLED: 2>]
setup.MTCS INFO: All components in <StateENABLED: 2>.

```

```
In [89]: # If M1M3 is not raised yet, use this command to raise it.
await mtcs.raise_m1m3()
```

```
setup.MTCS DEBUG: M1M3 current detailed state {<DetailedState.PARKEDENGINEERING: 9>, <DetailedState.PARKED: 5>}, executing command...
setup.MTCS DEBUG: process as completed...
setup.MTCS DEBUG: M1M3 detailed state 6
setup.MTCS DEBUG: mtm1m3: <State.ENABLED: 2>
setup.MTCS DEBUG: mtm1m3: <State.ENABLED: 2>
setup.MTCS DEBUG: M1M3 detailed state 7
```

```
In [90]: # Enables M1M3 Force Balance system using the hardpoints
await mtcs.enable_m1m3_balance_system()
```

```
setup.MTCS DEBUG: Enabling hardpoint corrections.
```

```
In [91]: # Resets the Aberration Forces and the Active Optics Forces
await mtcs.reset_m1m3_forces()
```

```
In [ ]: # M1M3 LUT use mount telemetry
# todo: how to do that?
```

## Get M2 Ready

- Turn on Force Balance system
- Clear forces

```
In [42]: # Enabled M2 Force Balance system
await mtcs.enable_m2_balance_system()
```

```
setup.MTCS INFO: M2 force balance system already enabled. Nothing to do.
```

```
In [43]: # Resets the Active Optics Forces
await mtcs.reset_m2_forces()
```

```
In [ ]: # Need to have M2 LUT use mount telemetry
# todo: how to do that?
```

## Get CamHex Ready

- Check config
- Make sure LUT is on, and has valid inputs
- Make sure hex is at LUT position

```
In [44]: # Check the configuration
await vandv.hexapod.get_hexapod_configuration(mtcs.rem.mthexapod_1)
```

```
MTHexapodID: 1, private_revCode: 047bbc0a, private_sndStamp: 1655518656.85541
3, private_rcvStamp: 1655762695.5406823, private_seqNum: 1, private_identity:
MTHexapod:1, private_origin: 9274, configurations: _init.yaml,_summit.yaml, ve
rsion: v0.8.1-0-g0400d07, url: file:///home/saluser/ts_config_mttcs/MTHexapod/
v3, schemaVersion: v3, otherInfo: , priority: 0
```

```
Pivot at (0.0, 0.0, -2758400.0) microns
maxXY = 11400.0 microns, maxZ = 13100.0 microns
maxUV = 0.36 deg, maxW = 0.1 deg
```

In [45]:

```
# Enable compensation mode for CamHex
await mtcs.enable_compensation_mode("mthexapod_1")
```

```
setup.MTCS WARNING: Compensation mode for mthexapod_1 already True. Nothing
to do.
```

In [46]:

```
# Reset the Camera Hexapod position
await mtcs.reset_camera_hexapod_position()
```

```
setup.MTCS INFO: Camera Hexapod compensation mode enabled. Move will offset
with respect to LUT.
```

```
setup.MTCS DEBUG: Wait for Camera Hexapod in position event.
```

```
setup.MTCS DEBUG: Camera Hexapod in position: True.
```

```
setup.MTCS DEBUG: Camera Hexapod already in position. Handling potential ra
ce condition.
```

```
setup.MTCS INFO: Camera Hexapod in position: False.
```

```
setup.MTCS INFO: Camera Hexapod in position: True.
```

```
setup.MTCS DEBUG: Camera Hexapod in position True. Waiting settle time 5.0s
```

In [47]:

```
# After resetting the Camera Hexapod position, we want to make sure that
# the compensation and non-compensation values are the same.
await vandv.hexapod.print_hexapod_uncompensation_values(mtcs.rem.mthexapod_1)
await vandv.hexapod.print_hexapod_compensation_values(mtcs.rem.mthexapod_1)
```

```
Uncompensated position
    0.00      0.00      0.00      0.000000      0.000000      0.000000      2022-0
6-20 23:37:28.766701568
Compensated position
    -0.89 um     -477.16 um     288.73 um     -0.013036 deg     0.000000 deg
    0.000000 deg     2022-06-20 23:37:28.766821888
```

In [48]:

```
# Need to have CamHex LUT use mount telemetry
await vandv.hexapod.check_hexapod_lut(mtcs.rem.mthexapod_1)
```

```
Does the hexapod has enough inputs to do LUT compensation? (If the below times
out, we do not.)
```

```
compensation mode enabled? True
mount elevation = 82.36031744487165
mount azimuth = 191.93500329594852
rotator angle = 0.0
temperature from sensors on the hex = 0.0
x = -0.89
y = -477.16
z = 288.73
u = -0.01
v = 0.00
w = 0.00
```

# Get M2Hex Ready

- Check config
- Make sure LUT is on, and has valid inputs
- Make sure M2Hex is at LUT position

In [49]:

```
# Check the configuration
await vandv.hexapod.get_hexapod_configuration(mtcs.rem.mthexapod_2)
```

```
MTHexapodID: 2, private_revCode: 047bbc0a, private_sndStamp: 1655479264.763605
6, private_rcvStamp: 1655762695.5402207, private_seqNum: 1, private_identity:
MTHexapod:2, private_origin: 64430, configurations: _init.yaml,_summit.yaml, v
ersion: v0.8.1-0-g0400d07, url: file:///home/saluser/ts_config_mttcs/MTHexapo
d/v3, schemaVersion: v3, otherInfo: , priority: 0
```

```
Pivot at (0.0, 0.0, 500000.0) microns
maxXY = 10500.0 microns, maxZ = 8900.0 microns
maxUV = 0.175 deg, maxW = 0.05 deg
```

In [50]:

```
# Enable compensation mode for M2Hex
await mtcs.enable_compensation_mode("mthexapod_2")
```

```
| setup.MTCS DEBUG: Setting mthexapod_2 compensation mode from False to True.
```

In [51]:

```
# Reset the M2 Hexapod position
await mtcs.reset_m2_hexapod_position()
```

```
| setup.MTCS INFO: M2 Hexapod compensation mode enabled. Move will offset wit
h respect to LUT.
| setup.MTCS DEBUG: Wait for M2 Hexapod in position event.
| setup.MTCS DEBUG: M2 Hexapod in position: False.
| setup.MTCS INFO: M2 Hexapod in position: True.
| setup.MTCS DEBUG: M2 Hexapod in position True. Waiting settle time 5.0s
```

In [52]:

```
# After resetting the Camera Hexapod position, we want to make sure that
# the compensation and non-compensation values are the same.
await vandv.hexapod.print_hexapod_uncompensation_values(mtcs.rem.mthexapod_2)
await vandv.hexapod.print_hexapod_compensation_values(mtcs.rem.mthexapod_2)
```

Uncompensated position						
0.00	0.00	0.00	0.000000	0.000000	0.000000	2022-0
6-20 23:37:47.945266176						
Compensated position						
-2.38 um	-416.99 um	305.31 um	-0.004898 deg	0.000000 deg		
0.000000 deg	2022-06-20 23:37:47.945390336					

In [53]:

```
# Need to have CamHex LUT use mount telemetry
await vandv.hexapod.check_hexapod_lut(mtcs.rem.mthexapod_1)
```

```
Does the hexapod has enough inputs to do LUT compensation? (If the below times
out, we do not.)
compensation mode enabled? True
mount elevation = 82.36031744487165
mount azimuth = 191.93500329594852
rotator angle = 0.0
temperature from sensors on the hex = 0.0
x = -0.89
y = -477.16
z = 288.73
u = -0.01
v = 0.00
w = 0.00
```

## Gather Data - Without Aberrations

Do 4 slews in sequence. For each slew, track for 39s, simulating a visit. Note: the 4 slews need to correspond to elevation angle between 86.5 deg and 82 deg. And, additional margin is needed due to tracking.

```
In [72]: # We start at 85.4 deg because the track fails at 85.5 deg
target_elevations = [85.4, 84.4, 83.4, 82.4]

t_start_without_aberration = Time.now()
t_start_without_aberration.format = "isot"
print(f"Gathering data - without Aberrations - Start time: {t_start_without_aberration}")

for _el in target_elevations:
    az, el = await moveMountInElevationSteps(_el, azimuth=190.5)

    target = mtcs.radec_from_azel(az=az, el=el)
    await mtcs.slew_icrs(ra=target.ra, dec=target.dec, rot_type=RotType.Physical)

    # 39. seconds is the exposure time (2 * 15 sec) plus readout
    time.sleep(39.)
    await mtcs.stop_tracking()

t_end_without_aberration = Time.now()
t_end_without_aberration.format = "isot"
print(f"Gathering data - without Aberrations - End time: {t_end_without_aberration}")
```

```
Gathering data - without Aberrations - Start time: 2022-06-21T00:36:46.077
Moving elevation to 82.36 deg
Moving elevation to 82.61 deg
MTHexapod.electrical WARNING: tel_electrical DDS read queue is filling: 20
of 100 elements
MTHexapod.electrical WARNING: tel_electrical DDS read queue is filling: 10
of 100 elements
MTHexapod.application WARNING: tel_application DDS read queue is filling: 1
0 of 100 elements
MTHexapod.application WARNING: tel_application DDS read queue is filling: 2
1 of 100 elements
MTHexapod.actuators WARNING: tel_actuators DDS read queue is filling: 20
of 100 elements
Moving elevation to 82.87 deg
```

```
MTHexapod.electrical WARNING: tel_electrical DDS read queue is filling: 20
of 100 elements
MTHexapod.electrical WARNING: tel_electrical DDS read queue is filling: 10
of 100 elements
MTHexapod.application WARNING: tel_application DDS read queue is filling: 2
0 of 100 elements
MTHexapod.application WARNING: tel_application DDS read queue is filling: 1
0 of 100 elements
MTHexapod.actuators WARNING: tel_actuators DDS read queue is filling: 19 of
100 elements
MTHexapod.actuators WARNING: tel_actuators DDS read queue is filling: 10 of
100 elements
Moving elevation to 83.12 deg
MTHexapod.electrical WARNING: tel_electrical DDS read queue is filling: 20
of 100 elements
MTHexapod.electrical WARNING: tel_electrical DDS read queue is filling: 10
of 100 elements
MTHexapod.application WARNING: tel_application DDS read queue is filling: 2
0 of 100 elements
MTHexapod.application WARNING: tel_application DDS read queue is filling: 1
0 of 100 elements
MTHexapod.actuators WARNING: tel_actuators DDS read queue is filling: 19 of
100 elements
Moving elevation to 83.37 deg
MTHexapod.electrical WARNING: tel_electrical DDS read queue is filling: 20
of 100 elements
MTHexapod.electrical WARNING: tel_electrical DDS read queue is filling: 10
of 100 elements
MTHexapod.application WARNING: tel_application DDS read queue is filling: 2
1 of 100 elements
MTHexapod.application WARNING: tel_application DDS read queue is filling: 1
0 of 100 elements
MTHexapod.actuators WARNING: tel_actuators DDS read queue is filling: 20 of
100 elements
Moving elevation to 83.63 deg
MTHexapod.electrical WARNING: tel_electrical DDS read queue is filling: 20
of 100 elements
MTHexapod.application WARNING: tel_application DDS read queue is filling: 1
0 of 100 elements
MTHexapod.application WARNING: tel_application DDS read queue is filling: 2
1 of 100 elements
MTHexapod.actuators WARNING: tel_actuators DDS read queue is filling: 20 of
100 elements
Moving elevation to 83.88 deg
MTHexapod.electrical WARNING: tel_electrical DDS read queue is filling: 10
of 100 elements
MTHexapod.electrical WARNING: tel_electrical DDS read queue is filling: 20
of 100 elements
MTHexapod.application WARNING: tel_application DDS read queue is filling: 1
0 of 100 elements
MTHexapod.application WARNING: tel_application DDS read queue is filling: 2
1 of 100 elements
```

```
MTHexapod.actuators WARNING: tel_actuators DDS read queue is filling: 20 of
100 elements
Moving elevation to 84.13 deg
MTHexapod.electrical WARNING: tel_electrical DDS read queue is filling: 10
of 100 elements
MTHexapod.electrical WARNING: tel_electrical DDS read queue is filling: 20
of 100 elements
MTHexapod.application WARNING: tel_application DDS read queue is filling: 1
0 of 100 elements
MTHexapod.application WARNING: tel_application DDS read queue is filling: 2
0 of 100 elements
MTHexapod.actuators WARNING: tel_actuators DDS read queue is filling: 20 of
100 elements
Moving elevation to 84.39 deg
MTHexapod.electrical WARNING: tel_electrical DDS read queue is filling: 20
of 100 elements
MTHexapod.electrical WARNING: tel_electrical DDS read queue is filling: 10
of 100 elements
MTHexapod.application WARNING: tel_application DDS read queue is filling: 2
0 of 100 elements
MTHexapod.application WARNING: tel_application DDS read queue is filling: 1
0 of 100 elements
MTHexapod.actuators WARNING: tel_actuators DDS read queue is filling: 19 of
100 elements
Moving elevation to 84.64 deg
MTHexapod.electrical WARNING: tel_electrical DDS read queue is filling: 20
of 100 elements
MTHexapod.application WARNING: tel_application DDS read queue is filling: 1
0 of 100 elements
MTHexapod.application WARNING: tel_application DDS read queue is filling: 2
0 of 100 elements
MTHexapod.actuators WARNING: tel_actuators DDS read queue is filling: 19 of
100 elements
Moving elevation to 84.89 deg
MTHexapod.electrical WARNING: tel_electrical DDS read queue is filling: 10
of 100 elements
MTHexapod.electrical WARNING: tel_electrical DDS read queue is filling: 20
of 100 elements
MTHexapod.application WARNING: tel_application DDS read queue is filling: 1
0 of 100 elements
MTHexapod.application WARNING: tel_application DDS read queue is filling: 2
1 of 100 elements
MTHexapod.actuators WARNING: tel_actuators DDS read queue is filling: 20 of
100 elements
Moving elevation to 85.15 deg
MTHexapod.electrical WARNING: tel_electrical DDS read queue is filling: 10
of 100 elements
MTHexapod.electrical WARNING: tel_electrical DDS read queue is filling: 20
of 100 elements
MTHexapod.application WARNING: tel_application DDS read queue is filling: 1
0 of 100 elements
MTHexapod.application WARNING: tel_application DDS read queue is filling: 2
1 of 100 elements
```

```
MTHexapod.actuators WARNING: tel_actuators DDS read queue is filling: 20 of
100 elements
Moving elevation to 85.40 deg
MTHexapod.electrical WARNING: tel_electrical DDS read queue is filling: 10
of 100 elements
MTHexapod.electrical WARNING: tel_electrical DDS read queue is filling: 20
of 100 elements
MTHexapod.application WARNING: tel_application DDS read queue is filling: 1
0 of 100 elements
MTHexapod.application WARNING: tel_application DDS read queue is filling: 2
1 of 100 elements
MTHexapod.actuators WARNING: tel_actuators DDS read queue is filling: 20 of
100 elements
WARNING: AstropyDeprecationWarning: Transforming a frame instance to a frame c
lass (as opposed to another frame instance) will not be supported in the futur
e. Either explicitly instantiate the target frame, or first convert the sourc
e frame instance to a `astropy.coordinates.SkyCoord` and use its `transform_
()` method. [astropy.coordinates.baseframe]
astroquery WARNING: AstropyDeprecationWarning: Transforming a frame instanc
e to a frame class (as opposed to another frame instance) will not be suppo
rted in the future. Either explicitly instantiate the target frame, or fir
st convert the source frame instance to a `astropy.coordinates.SkyCoord` an
d use its `transform_to()` method.
setup.MTCS DEBUG: Setting rotator to physical fixed position 0.0 deg. Rotat
or will not track.
MTHexapod.electrical WARNING: tel_electrical DDS read queue is filling: 11
of 100 elements
MTHexapod.electrical WARNING: tel_electrical DDS read queue is filling: 21
of 100 elements
MTHexapod.application WARNING: tel_application DDS read queue is filling: 1
1 of 100 elements
MTHexapod.application WARNING: tel_application DDS read queue is filling: 2
1 of 100 elements
MTHexapod.actuators WARNING: tel_actuators DDS read queue is filling: 10 of
100 elements
MTHexapod.actuators WARNING: tel_actuators DDS read queue is filling: 20 of
100 elements
setup.MTCS DEBUG: Wait 5.0s for rotator to settle down.
setup.MTCS DEBUG: Workaround for rotator trajectory problem. Moving rotator
to its current position: 0.10
setup.MTCS DEBUG: Wait for MTRotator in position event.
setup.MTCS DEBUG: MTRotator in position: False.
setup.MTCS INFO: MTRotator in position: True.
setup.MTCS DEBUG: MTRotator in position True. Waiting settle time 5.0s
setup.MTCS DEBUG: Sending slew command.
setup.MTCS DEBUG: Scheduling check coroutines
setup.MTCS DEBUG: process as completed...
setup.MTCS DEBUG: Monitor position started.
setup.MTCS DEBUG: Waiting for Target event from mtmount.
setup.MTCS DEBUG: mtmount: <State.ENABLED: 2>
setup.MTCS DEBUG: mpttg: <State.ENABLED: 2>
setup.MTCS DEBUG: mtaos: <State.ENABLED: 2>
```

```
setup.MTCS DEBUG: mtm1m3: <State.ENABLED: 2>
setup.MTCS DEBUG: mtm2: <State.ENABLED: 2>
setup.MTCS DEBUG: mthexapod_1: <State.ENABLED: 2>
setup.MTCS DEBUG: mthexapod_2: <State.ENABLED: 2>
setup.MTCS DEBUG: mtrotator: <State.ENABLED: 2>
setup.MTCS DEBUG: mtdome: <State.ENABLED: 2>
setup.MTCS DEBUG: mtdometrajectory: <State.ENABLED: 2>
setup.MTCS DEBUG: Wait for mtmount in position events.
setup.MTCS DEBUG: Wait for dome in position event.
setup.MTCS DEBUG: Wait for MTRotator in position event.
setup.MTCS DEBUG: MTRotator in position: True.
setup.MTCS DEBUG: MTRotator already in position. Handling potential race condition.
setup.MTCS DEBUG: Wait for MTMount elevation in position event.
setup.MTCS DEBUG: MTMount elevation in position: True.
setup.MTCS DEBUG: MTMount elevation already in position. Handling potential race condition.
setup.MTCS DEBUG: Wait for MTMount azimuth in position event.
setup.MTCS DEBUG: MTMount azimuth in position: True.
setup.MTCS DEBUG: MTMount azimuth already in position. Handling potential race condition.
setup.MTCS DEBUG: Mount target: private_revCode: bdcb00ba, private_sndStamp: 1655771880.0407345, private_rcvStamp: 1655771880.0409942, private_seqNum: 21590, private_identity: MTMount, private_origin: 44621, elevation: 85.39043100399344, elevationVelocity: -0.0006982272046395735, azimuth: 191.15543490079102, azimuthVelocity: 0.041806661864438266, taiTime: 1655771880.0998347, trackId: 13, tracksys: SIDEREAL, radesys: ICRS, priority: 0
setup.MTCS INFO: MTMount elevation in position: False.
setup.MTCS INFO: MTMount azimuth in position: False.
setup.MTCS INFO: MTMount elevation in position: True.
setup.MTCS DEBUG: MTMount elevation in position True. Waiting settle time 3.0s
setup.MTCS DEBUG: [Tel]: Az = +190.503[ +0.7]; El = +085.399[ -0.0] [Rot]: +000.100[ -0.0] [Dome] Az = +000.000; El = +000.000
setup.MTCS DEBUG: Dome azimuth in position.
setup.MTCS DEBUG: Dome elevation in position.
setup.MTCS INFO: MTRotator in position: False.
setup.MTCS INFO: MTRotator in position: True.
setup.MTCS DEBUG: MTRotator in position True. Waiting settle time 3.0s
setup.MTCS INFO: MTMount azimuth in position: True.
setup.MTCS DEBUG: MTMount azimuth in position True. Waiting settle time 3.0s
setup.MTCS DEBUG: Stop tracking.
MTM1M3.powerSupplyData ERROR: tel_powerSupplyData DDS read queue is full (100 elements); data may be lost
MTPtg.timeAndDate ERROR: tel_timeAndDate DDS read queue is full (100 elements); data may be lost
MTMount.elevation ERROR: tel_elevation DDS read queue is full (100 elements); data may be lost
MTHexapod.electrical ERROR: tel_electrical DDS read queue is full (100 elements); data may be lost
```

```
MTRotator.rotation ERROR: tel_rotation DDS read queue is full (100 elements); data may be lost
MTHexapod.electrical ERROR: tel_electrical DDS read queue is full (100 elements); data may be lost
MTHexapod.application ERROR: tel_application DDS read queue is full (100 elements); data may be lost
MTHexapod.application ERROR: tel_application DDS read queue is full (100 elements); data may be lost
MTM2.tangentEncoderPositions ERROR: tel_tangentEncoderPositions DDS read queue is full (100 elements); data may be lost
MTRotator.motors ERROR: tel_motors DDS read queue is full (100 elements); data may be lost
MTMount.cameraCableWrap ERROR: tel_cameraCableWrap DDS read queue is full (100 elements); data may be lost
MTM1M3.pidData ERROR: tel_pidData DDS read queue is full (100 elements); data may be lost
MTPtg.mountStatus ERROR: tel_mountStatus DDS read queue is full (100 elements); data may be lost
MTDome.azimuth ERROR: tel_azimuth DDS read queue is full (100 elements); data may be lost
MTPtg.mountPosition ERROR: tel_mountPosition DDS read queue is full (100 elements); data may be lost
MTM2.powerStatus ERROR: tel_powerStatus DDS read queue is full (100 elements); data may be lost
MTHexapod.actuators ERROR: tel_actuators DDS read queue is full (100 elements); data may be lost
MTMount.azimuth ERROR: tel_azimuth DDS read queue is full (100 elements); data may be lost
MTPtg.currentTargetStatus ERROR: tel_currentTargetStatus DDS read queue is full (100 elements); data may be lost
MTM2.positionIMS ERROR: tel_positionIMS DDS read queue is full (100 elements); data may be lost
MTHexapod.actuators ERROR: tel_actuators DDS read queue is full (100 elements); data may be lost
MTHexapod.logevent_heartbeat WARNING: evt_heartbeat DDS read queue is filling: 39 of 100 elements
MTDome.logevent_azMotion ERROR: evt_azMotion DDS read queue is full (100 elements); data may be lost
MTRotator.electrical ERROR: tel_electrical DDS read queue is full (100 elements); data may be lost
MTRotator.ccwFollowingError ERROR: tel_ccwFollowingError DDS read queue is full (100 elements); data may be lost
MTM2.position ERROR: tel_position DDS read queue is full (100 elements); data may be lost
MTRotator.logevent_target ERROR: evt_target DDS read queue is full (100 elements); data may be lost
MTM1M3.outerLoopData ERROR: tel_outerLoopData DDS read queue is full (100 elements); data may be lost
MTM2.netMomentsTotal ERROR: tel_netMomentsTotal DDS read queue is full (100 elements); data may be lost
MTMount.logevent_target ERROR: evt_target DDS read queue is full (100 elements); data may be lost
```

```
MTHexapod.logevent_heartbeat WARNING: evt_heartbeat DDS read queue is filling: 39 of 100 elements
MTM2.netForcesTotal ERROR: tel_netForcesTotal DDS read queue is full (100 elements); data may be lost
Moving elevation to 85.36 deg
MTM2.ilcData ERROR: tel_ilcData DDS read queue is full (100 elements); data may be lost
MTMount.logevent_cameraCableWrapTarget ERROR: evt_cameraCableWrapTarget DDS read queue is full (100 elements); data may be lost
MTM1M3.inclinometerData ERROR: tel_inclinometerData DDS read queue is full (100 elements); data may be lost
MTM2.forceBalance ERROR: tel_forceBalance DDS read queue is full (100 elements); data may be lost
MTM2.displacementSensors ERROR: tel_displacementSensors DDS read queue is full (100 elements); data may be lost
MTM1M3.imsData ERROR: tel_imsData DDS read queue is full (100 elements); data may be lost
MTM2.axialEncoderPositions ERROR: tel_axialEncoderPositions DDS read queue is full (100 elements); data may be lost
MTM1M3.hardpointMonitorData ERROR: tel_hardpointMonitorData DDS read queue is full (100 elements); data may be lost
MTM1M3.hardpointActuatorData ERROR: tel_hardpointActuatorData DDS read queue is full (100 elements); data may be lost
MTM1M3.forceActuatorData ERROR: tel_forceActuatorData DDS read queue is full (100 elements); data may be lost
MTM1M3.accelerometerData ERROR: tel_accelerometerData DDS read queue is full (100 elements); data may be lost
MTM1M3.logevent_forceActuatorWarning ERROR: evt_forceActuatorWarning DDS read queue is full (100 elements); data may be lost
MTM1M3.logevent_appliedThermalForces ERROR: evt_appliedThermalForces DDS read queue is full (100 elements); data may be lost
MTM1M3.logevent_appliedStaticForces ERROR: evt_appliedStaticForces DDS read queue is full (100 elements); data may be lost
MTM1M3.logevent_appliedForces ERROR: evt_appliedForces DDS read queue is full (100 elements); data may be lost
MTM1M3.logevent_appliedElevationForces ERROR: evt_appliedElevationForces DDS read queue is full (100 elements); data may be lost
MTM1M3.logevent_appliedCylinderForces ERROR: evt_appliedCylinderForces DDS read queue is full (100 elements); data may be lost
MTM1M3.logevent_appliedBalanceForces ERROR: evt_appliedBalanceForces DDS read queue is full (100 elements); data may be lost
MTM1M3.logevent_appliedAzimuthForces ERROR: evt_appliedAzimuthForces DDS read queue is full (100 elements); data may be lost
MTM1M3.logevent_appliedActiveOpticForces ERROR: evt_appliedActiveOpticForces DDS read queue is full (100 elements); data may be lost
MTM1M3.logevent_appliedAberrationForces ERROR: evt_appliedAberrationForces DDS read queue is full (100 elements); data may be lost
Moving elevation to 85.04 deg
MTHexapod.electrical WARNING: tel_electrical DDS read queue is filling: 20 of 100 elements
MTHexapod.electrical WARNING: tel_electrical DDS read queue is filling: 10 of 100 elements
```

```
MTHexapod.application WARNING: tel_application DDS read queue is filling: 2  
0 of 100 elements  
MTHexapod.application WARNING: tel_application DDS read queue is filling: 1  
0 of 100 elements  
MTHexapod.actuators WARNING: tel_actuators DDS read queue is filling: 19 of  
100 elements  
Moving elevation to 84.72 deg  
MTHexapod.electrical WARNING: tel_electrical DDS read queue is filling: 10  
of 100 elements  
MTHexapod.electrical WARNING: tel_electrical DDS read queue is filling: 20  
of 100 elements  
MTHexapod.application WARNING: tel_application DDS read queue is filling: 1  
0 of 100 elements  
MTHexapod.application WARNING: tel_application DDS read queue is filling: 2  
0 of 100 elements  
MTHexapod.actuators WARNING: tel_actuators DDS read queue is filling: 20 of  
100 elements  
Moving elevation to 84.40 deg  
MTHexapod.electrical WARNING: tel_electrical DDS read queue is filling: 20  
of 100 elements  
MTHexapod.electrical WARNING: tel_electrical DDS read queue is filling: 10  
of 100 elements  
MTHexapod.application WARNING: tel_application DDS read queue is filling: 2  
0 of 100 elements  
MTHexapod.application WARNING: tel_application DDS read queue is filling: 1  
0 of 100 elements  
MTHexapod.actuators WARNING: tel_actuators DDS read queue is filling: 20 of  
100 elements  
setup.MTCS DEBUG: Setting rotator to physical fixed position 0.0 deg. Rotat  
or will not track.  
MTHexapod.electrical WARNING: tel_electrical DDS read queue is filling: 10  
of 100 elements  
MTHexapod.electrical WARNING: tel_electrical DDS read queue is filling: 21  
of 100 elements  
MTHexapod.application WARNING: tel_application DDS read queue is filling: 1  
0 of 100 elements  
MTHexapod.application WARNING: tel_application DDS read queue is filling: 2  
1 of 100 elements  
MTHexapod.actuators WARNING: tel_actuators DDS read queue is filling: 20 of  
100 elements  
setup.MTCS DEBUG: Wait 5.0s for rotator to settle down.  
setup.MTCS DEBUG: Workaround for rotator trajectory problem. Moving rotator  
to its current position: 0.10  
setup.MTCS DEBUG: Wait for MTRotator in position event.  
setup.MTCS DEBUG: MTRotator in position: True.  
setup.MTCS DEBUG: MTRotator already in position. Handling potential race co  
ndition.  
setup.MTCS INFO: MTRotator in position: False.  
setup.MTCS INFO: MTRotator in position: True.  
setup.MTCS DEBUG: MTRotator in position True. Waiting settle time 5.0s  
setup.MTCS DEBUG: Sending slew command.  
setup.MTCS DEBUG: Scheduling check coroutines
```

```
setup.MTCS DEBUG: process as completed...
setup.MTCS DEBUG: Monitor position started.
setup.MTCS DEBUG: Waiting for Target event from mtmount.
setup.MTCS DEBUG: mtmount: <State.ENABLED: 2>
setup.MTCS DEBUG: mtptg: <State.ENABLED: 2>
setup.MTCS DEBUG: mtaos: <State.ENABLED: 2>
setup.MTCS DEBUG: mtm1m3: <State.ENABLED: 2>
setup.MTCS DEBUG: mtm2: <State.ENABLED: 2>
setup.MTCS DEBUG: mthexapod_1: <State.ENABLED: 2>
setup.MTCS DEBUG: mthexapod_2: <State.ENABLED: 2>
setup.MTCS DEBUG: mtrotator: <State.ENABLED: 2>
setup.MTCS DEBUG: mt dome: <State.ENABLED: 2>
setup.MTCS DEBUG: mt dome trajectory: <State.ENABLED: 2>
setup.MTCS DEBUG: Wait for mtmount in position events.
setup.MTCS DEBUG: Wait for dome in position event.
setup.MTCS DEBUG: Wait for MTRotator in position event.
setup.MTCS DEBUG: MTRotator in position: True.
setup.MTCS DEBUG: MTRotator already in position. Handling potential race condition.
setup.MTCS DEBUG: Wait for MTMount elevation in position event.
setup.MTCS DEBUG: MTMount elevation in position: True.
setup.MTCS DEBUG: MTMount elevation already in position. Handling potential race condition.
setup.MTCS DEBUG: Wait for MTMount azimuth in position event.
setup.MTCS DEBUG: MTMount azimuth in position: True.
setup.MTCS DEBUG: MTMount azimuth already in position. Handling potential race condition.
setup.MTCS DEBUG: Mount target: private_revCode: bdcb00ba, private_sndStamp: 1655771946.1249099, private_rcvStamp: 1655771946.1252565, private_seqNum: 22446, private_identity: MTMount, private_origin: 44621, elevation: 84.39075211478229, elevationVelocity: -0.0006904518108125126, azimuth: 191.02983190309104, azimuthVelocity: 0.03395880226650336, taiTime: 1655771946.183398, trackId: 14, tracksys: SIDEREAL, radesys: ICRS, priority: 0
setup.MTCS INFO: MTMount elevation in position: False.
setup.MTCS INFO: MTMount azimuth in position: False.
setup.MTCS INFO: MTMount elevation in position: True.
setup.MTCS DEBUG: MTMount elevation in position True. Waiting settle time 3.0s
setup.MTCS DEBUG: [Tel]: Az = +190.502[ +0.5]; El = +084.399[ -0.0] [Rot]: +000.100[ +0.0] [Dome] Az = +000.000; El = +000.000
setup.MTCS DEBUG: Dome azimuth in position.
setup.MTCS DEBUG: Dome elevation in position.
setup.MTCS INFO: MTRotator in position: False.
setup.MTCS INFO: MTMount azimuth in position: True.
setup.MTCS DEBUG: MTMount azimuth in position True. Waiting settle time 3.0s
setup.MTCS INFO: MTRotator in position: True.
setup.MTCS DEBUG: MTRotator in position True. Waiting settle time 3.0s
setup.MTCS DEBUG: Stop tracking.
```

```
MTRotator.rotation ERROR: tel_rotation DDS read queue is full (100 elements); data may be lost
MTPtg.timeAndDate ERROR: tel_timeAndDate DDS read queue is full (100 elements); data may be lost
MTM1M3.powerSupplyData ERROR: tel_powerSupplyData DDS read queue is full (100 elements); data may be lost
MTHexapod.electrical ERROR: tel_electrical DDS read queue is full (100 elements); data may be lost
MTHexapod.electrical ERROR: tel_electrical DDS read queue is full (100 elements); data may be lost
MTMount.elevation ERROR: tel_elevation DDS read queue is full (100 elements); data may be lost
MTRotator.motors ERROR: tel_motors DDS read queue is full (100 elements); data may be lost
MTHexapod.application ERROR: tel_application DDS read queue is full (100 elements); data may be lost
MTHexapod.application ERROR: tel_application DDS read queue is full (100 elements); data may be lost
MTM2.tangentEncoderPositions ERROR: tel_tangentEncoderPositions DDS read queue is full (100 elements); data may be lost
MTMount.cameraCableWrap ERROR: tel_cameraCableWrap DDS read queue is full (100 elements); data may be lost
MTM1M3.pidData ERROR: tel_pidData DDS read queue is full (100 elements); data may be lost
MTMount.azimuth ERROR: tel_azimuth DDS read queue is full (100 elements); data may be lost
MTMount.azimuth ERROR: tel_azimuth DDS read queue is full (100 elements); data may be lost
MTPtg.mountStatus ERROR: tel_mountStatus DDS read queue is full (100 elements); data may be lost
MTM2.powerStatus ERROR: tel_powerStatus DDS read queue is full (100 elements); data may be lost
MTDome.azimuth ERROR: tel_azimuth DDS read queue is full (100 elements); data may be lost
MTPtg.mountPosition ERROR: tel_mountPosition DDS read queue is full (100 elements); data may be lost
MTHexapod.actuators ERROR: tel_actuators DDS read queue is full (100 elements); data may be lost
MTM2.positionIMS ERROR: tel_positionIMS DDS read queue is full (100 elements); data may be lost
MTRotator.electrical ERROR: tel_electrical DDS read queue is full (100 elements); data may be lost
MTHexapod.logevent_heartbeat WARNING: evt_heartbeat DDS read queue is filling: 39 of 100 elements
MTM2.position ERROR: tel_position DDS read queue is full (100 elements); data may be lost
MTRotator.ccwFollowingError ERROR: tel_ccwFollowingError DDS read queue is full (100 elements); data may be lost
MTPtg.currentTargetStatus ERROR: tel_currentTargetStatus DDS read queue is full (100 elements); data may be lost
MTHexapod.actuators ERROR: tel_actuators DDS read queue is full (100 elements); data may be lost
MTMount.logevent_target ERROR: evt_target DDS read queue is full (100 elements); data may be lost
```

```
MTHexapod.logevent_heartbeat WARNING: evt_heartbeat DDS read queue is filling: 39 of 100 elements
MTDome.logevent_azMotion ERROR: evt_azMotion DDS read queue is full (100 elements); data may be lost
MTM2.netMomentsTotal ERROR: tel_netMomentsTotal DDS read queue is full (100 elements); data may be lost
MTRotator.logevent_target ERROR: evt_target DDS read queue is full (100 elements); data may be lost
MTM1M3.outerLoopData ERROR: tel_outerLoopData DDS read queue is full (100 elements); data may be lost
MTM2.netForcesTotal ERROR: tel_netForcesTotal DDS read queue is full (100 elements); data may be lost
MTMount.logevent_cameraCableWrapTarget ERROR: evt_cameraCableWrapTarget DDS read queue is full (100 elements); data may be lost
Moving elevation to 84.36 deg
MTM2.ilcData ERROR: tel_ilcData DDS read queue is full (100 elements); data may be lost
MTM1M3.inclinometerData ERROR: tel_inclinometerData DDS read queue is full (100 elements); data may be lost
MTM2.forceBalance ERROR: tel_forceBalance DDS read queue is full (100 elements); data may be lost
MTM1M3.imsData ERROR: tel_imsData DDS read queue is full (100 elements); data may be lost
MTM2.displacementSensors ERROR: tel_displacementSensors DDS read queue is full (100 elements); data may be lost
MTM2.axialEncoderPositions ERROR: tel_axialEncoderPositions DDS read queue is full (100 elements); data may be lost
MTM1M3.hardpointMonitorData ERROR: tel_hardpointMonitorData DDS read queue is full (100 elements); data may be lost
MTM1M3.hardpointActuatorData ERROR: tel_hardpointActuatorData DDS read queue is full (100 elements); data may be lost
MTM1M3.forceActuatorData ERROR: tel_forceActuatorData DDS read queue is full (100 elements); data may be lost
MTM1M3.accelerometerData ERROR: tel_accelerometerData DDS read queue is full (100 elements); data may be lost
MTM1M3.logevent_forceActuatorWarning ERROR: evt_forceActuatorWarning DDS read queue is full (100 elements); data may be lost
MTM1M3.logevent_appliedThermalForces ERROR: evt_appliedThermalForces DDS read queue is full (100 elements); data may be lost
MTM1M3.logevent_appliedStaticForces ERROR: evt_appliedStaticForces DDS read queue is full (100 elements); data may be lost
MTM1M3.logevent_appliedForces ERROR: evt_appliedForces DDS read queue is full (100 elements); data may be lost
MTM1M3.logevent_appliedElevationForces ERROR: evt_appliedElevationForces DDS read queue is full (100 elements); data may be lost
MTM1M3.logevent_appliedCylinderForces ERROR: evt_appliedCylinderForces DDS read queue is full (100 elements); data may be lost
MTM1M3.logevent_appliedBalanceForces ERROR: evt_appliedBalanceForces DDS read queue is full (100 elements); data may be lost
MTM1M3.logevent_appliedAzimuthForces ERROR: evt_appliedAzimuthForces DDS read queue is full (100 elements); data may be lost
MTM1M3.logevent_appliedActiveOpticForces ERROR: evt_appliedActiveOpticForces DDS read queue is full (100 elements); data may be lost
```

```
MTM1M3.logevent_appliedAberrationForces ERROR: evt_appliedAberrationForces
DDS read queue is full (100 elements); data may be lost
Moving elevation to 84.04 deg
MTHexapod.electrical WARNING: tel_electrical DDS read queue is filling: 20
of 100 elements
MTHexapod.electrical WARNING: tel_electrical DDS read queue is filling: 10
of 100 elements
MTHexapod.application WARNING: tel_application DDS read queue is filling: 1
0 of 100 elements
MTHexapod.application WARNING: tel_application DDS read queue is filling: 2
1 of 100 elements
MTHexapod.actuators WARNING: tel_actuators DDS read queue is filling: 20 of
100 elements
Moving elevation to 83.72 deg
MTHexapod.electrical WARNING: tel_electrical DDS read queue is filling: 20
of 100 elements
MTHexapod.electrical WARNING: tel_electrical DDS read queue is filling: 10
of 100 elements
MTHexapod.application WARNING: tel_application DDS read queue is filling: 2
0 of 100 elements
MTHexapod.application WARNING: tel_application DDS read queue is filling: 1
0 of 100 elements
MTHexapod.actuators WARNING: tel_actuators DDS read queue is filling: 19 of
100 elements
Moving elevation to 83.40 deg
MTHexapod.electrical WARNING: tel_electrical DDS read queue is filling: 20
of 100 elements
MTHexapod.electrical WARNING: tel_electrical DDS read queue is filling: 10
of 100 elements
MTHexapod.application WARNING: tel_application DDS read queue is filling: 2
0 of 100 elements
MTHexapod.application WARNING: tel_application DDS read queue is filling: 1
0 of 100 elements
MTHexapod.actuators WARNING: tel_actuators DDS read queue is filling: 19 of
100 elements
setup.MTCS DEBUG: Setting rotator to physical fixed position 0.0 deg. Rotat
or will not track.
MTHexapod.electrical WARNING: tel_electrical DDS read queue is filling: 20
of 100 elements
MTHexapod.electrical WARNING: tel_electrical DDS read queue is filling: 10
of 100 elements
MTHexapod.application WARNING: tel_application DDS read queue is filling: 2
0 of 100 elements
MTHexapod.application WARNING: tel_application DDS read queue is filling: 1
0 of 100 elements
MTHexapod.actuators WARNING: tel_actuators DDS read queue is filling: 20 of
100 elements
setup.MTCS DEBUG: Wait 5.0s for rotator to settle down.
setup.MTCS DEBUG: Workaround for rotator trajectory problem. Moving rotator
to its current position: -0.10
setup.MTCS DEBUG: Wait for MTRotator in position event.
setup.MTCS DEBUG: MTRotator in position: True.
```

```
setup.MTCS DEBUG: MTRotator already in position. Handling potential race co  
ndition.  
setup.MTCS INFO: MTRotator in position: False.  
setup.MTCS INFO: MTRotator in position: True.  
setup.MTCS DEBUG: MTRotator in position True. Waiting settle time 5.0s  
setup.MTCS DEBUG: Sending slew command.  
setup.MTCS DEBUG: Scheduling check coroutines  
setup.MTCS DEBUG: process as completed...  
setup.MTCS DEBUG: Monitor position started.  
setup.MTCS DEBUG: Waiting for Target event from mtmount.  
setup.MTCS DEBUG: mtmount: <State.ENABLED: 2>  
setup.MTCS DEBUG: mpttg: <State.ENABLED: 2>  
setup.MTCS DEBUG: mtaos: <State.ENABLED: 2>  
setup.MTCS DEBUG: mtm1m3: <State.ENABLED: 2>  
setup.MTCS DEBUG: mtm2: <State.ENABLED: 2>  
setup.MTCS DEBUG: mthexapod_1: <State.ENABLED: 2>  
setup.MTCS DEBUG: mthexapod_2: <State.ENABLED: 2>  
setup.MTCS DEBUG: mtrotator: <State.ENABLED: 2>  
setup.MTCS DEBUG: mt dome: <State.ENABLED: 2>  
setup.MTCS DEBUG: mt dometrajectory: <State.ENABLED: 2>  
setup.MTCS DEBUG: Wait for mtmount in position events.  
setup.MTCS DEBUG: Wait for dome in position event.  
setup.MTCS DEBUG: Wait for MTRotator in position event.  
setup.MTCS DEBUG: MTRotator in position: True.  
setup.MTCS DEBUG: MTRotator already in position. Handling potential race co  
ndition.  
setup.MTCS DEBUG: Wait for MTMount elevation in position event.  
setup.MTCS DEBUG: MTMount elevation in position: True.  
setup.MTCS DEBUG: MTMount elevation already in position. Handling potential  
race condition.  
setup.MTCS DEBUG: Wait for MTMount azimuth in position event.  
setup.MTCS DEBUG: MTMount azimuth in position: True.  
setup.MTCS DEBUG: MTMount azimuth already in position. Handling potential r  
ace condition.  
setup.MTCS DEBUG: Mount target: private_revCode: bdcb00ba, private_sndStam  
p: 1655772014.0097392, private_rcvStamp: 1655772014.0100348, private_seqNu  
m: 23337, private_identity: MTMount, private_origin: 44621, elevation: 83.3  
910155568462, elevationVelocity: -0.0006851253573766477, azimuth: 190.94382  
60217663, azimuthVelocity: 0.028474308146413246, taiTime: 1655772014.068909  
2, trackId: 15, tracksys: SIDEREAL, radesys: ICRS, priority: 0  
setup.MTCS INFO: MTMount elevation in position: False.  
setup.MTCS INFO: MTMount azimuth in position: False.  
setup.MTCS INFO: MTMount elevation in position: True.  
setup.MTCS DEBUG: MTMount elevation in position True. Waiting settle time  
3.0s  
setup.MTCS INFO: MTRotator in position: False.  
setup.MTCS INFO: MTMount azimuth in position: True.  
setup.MTCS DEBUG: MTMount azimuth in position True. Waiting settle time 3.0  
s  
setup.MTCS INFO: MTRotator in position: True.
```

```
setup.MTCS DEBUG: MTRotator in position True. Waiting settle time 3.0s
setup.MTCS DEBUG: [Tel]: Az = +190.505[ +0.4]; El = +083.397[ -0.0] [Rot]: -000.100[ +0.0] [Dome] Az = +000.000; El = +000.000
setup.MTCS DEBUG: Dome azimuth in position.
setup.MTCS DEBUG: Dome elevation in position.
setup.MTCS DEBUG: Stop tracking.
MTPtg.timeAndDate ERROR: tel_timeAndDate DDS read queue is full (100 elements); data may be lost
MTHexapod.electrical ERROR: tel_electrical DDS read queue is full (100 elements); data may be lost
MTM1M3.powerSupplyData ERROR: tel_powerSupplyData DDS read queue is full (100 elements); data may be lost
MTMount.elevation ERROR: tel_elevation DDS read queue is full (100 elements); data may be lost
MTHexapod.electrical ERROR: tel_electrical DDS read queue is full (100 elements); data may be lost
MTRotator.rotation ERROR: tel_rotation DDS read queue is full (100 elements); data may be lost
MTHexapod.application ERROR: tel_application DDS read queue is full (100 elements); data may be lost
MTHexapod.application ERROR: tel_application DDS read queue is full (100 elements); data may be lost
MTMount.cameraCableWrap ERROR: tel_cameraCableWrap DDS read queue is full (100 elements); data may be lost
MTM1M3.pidData ERROR: tel_pidData DDS read queue is full (100 elements); data may be lost
MTM2.tangentEncoderPositions ERROR: tel_tangentEncoderPositions DDS read queue is full (100 elements); data may be lost
MTHexapod.actuators ERROR: tel_actuators DDS read queue is full (100 elements); data may be lost
MTHexapod.actuators ERROR: tel_actuators DDS read queue is full (100 elements); data may be lost
MTDome.azimuth ERROR: tel_azimuth DDS read queue is full (100 elements); data may be lost
MTPtg.mountStatus ERROR: tel_mountStatus DDS read queue is full (100 elements); data may be lost
MTRotator.motors ERROR: tel_motors DDS read queue is full (100 elements); data may be lost
MTHexapod.logevent_heartbeat WARNING: evt_heartbeat DDS read queue is filling: 39 of 100 elements
MTMount.azimuth ERROR: tel_azimuth DDS read queue is full (100 elements); data may be lost
MTPtg.mountPosition ERROR: tel_mountPosition DDS read queue is full (100 elements); data may be lost
MTRotator.electrical ERROR: tel_electrical DDS read queue is full (100 elements); data may be lost
MTM2.powerStatus ERROR: tel_powerStatus DDS read queue is full (100 elements); data may be lost
MTPtg.currentTargetStatus ERROR: tel_currentTargetStatus DDS read queue is full (100 elements); data may be lost
MTDome.logevent_azMotion ERROR: evt_azMotion DDS read queue is full (100 elements); data may be lost
```

```
MTHexapod.logevent_heartbeat WARNING: evt_heartbeat DDS read queue is filling: 39 of 100 elements
MTM2.positionIMS ERROR: tel_positionIMS DDS read queue is full (100 elements); data may be lost
MTM1M3.outerLoopData ERROR: tel_outerLoopData DDS read queue is full (100 elements); data may be lost
MTMount.logevent_target ERROR: evt_target DDS read queue is full (100 elements); data may be lost
MTM2.position ERROR: tel_position DDS read queue is full (100 elements); data may be lost
MTRotator.ccwFollowingError ERROR: tel_ccwFollowingError DDS read queue is full (100 elements); data may be lost
MTM2.netMomentsTotal ERROR: tel_netMomentsTotal DDS read queue is full (100 elements); data may be lost
MTRotator.logevent_target ERROR: evt_target DDS read queue is full (100 elements); data may be lost
MTMount.logevent_cameraCableWrapTarget ERROR: evt_cameraCableWrapTarget DDS read queue is full (100 elements); data may be lost
Moving elevation to 83.36 deg
MTM2.netForcesTotal ERROR: tel_netForcesTotal DDS read queue is full (100 elements); data may be lost
MTM1M3.inclinometerData ERROR: tel_inclinometerData DDS read queue is full (100 elements); data may be lost
MTM2.ilcData ERROR: tel_ilcData DDS read queue is full (100 elements); data may be lost
MTM2.forceBalance ERROR: tel_forceBalance DDS read queue is full (100 elements); data may be lost
MTM2.displacementSensors ERROR: tel_displacementSensors DDS read queue is full (100 elements); data may be lost
MTM1M3.imsData ERROR: tel_imsData DDS read queue is full (100 elements); data may be lost
MTM1M3.hardpointMonitorData ERROR: tel_hardpointMonitorData DDS read queue is full (100 elements); data may be lost
MTM2.axialEncoderPositions ERROR: tel_axialEncoderPositions DDS read queue is full (100 elements); data may be lost
MTM1M3.hardpointActuatorData ERROR: tel_hardpointActuatorData DDS read queue is full (100 elements); data may be lost
MTM1M3.forceActuatorData ERROR: tel_forceActuatorData DDS read queue is full (100 elements); data may be lost
MTM1M3.accelerometerData ERROR: tel_accelerometerData DDS read queue is full (100 elements); data may be lost
MTM1M3.logevent_forceActuatorWarning ERROR: evt_forceActuatorWarning DDS read queue is full (100 elements); data may be lost
MTM1M3.logevent_appliedThermalForces ERROR: evt_appliedThermalForces DDS read queue is full (100 elements); data may be lost
MTM1M3.logevent_appliedStaticForces ERROR: evt_appliedStaticForces DDS read queue is full (100 elements); data may be lost
MTM1M3.logevent_appliedForces ERROR: evt_appliedForces DDS read queue is full (100 elements); data may be lost
MTM1M3.logevent_appliedElevationForces ERROR: evt_appliedElevationForces DDS read queue is full (100 elements); data may be lost
MTM1M3.logevent_appliedCylinderForces ERROR: evt_appliedCylinderForces DDS read queue is full (100 elements); data may be lost
```

```
MTM1M3.logevent_appliedBalanceForces ERROR: evt_appliedBalanceForces DDS read queue is full (100 elements); data may be lost
MTM1M3.logevent_appliedAzimuthForces ERROR: evt_appliedAzimuthForces DDS read queue is full (100 elements); data may be lost
MTM1M3.logevent_appliedActiveOpticForces ERROR: evt_appliedActiveOpticForces DDS read queue is full (100 elements); data may be lost
MTM1M3.logevent_appliedAberrationForces ERROR: evt_appliedAberrationForces DDS read queue is full (100 elements); data may be lost
Moving elevation to 83.04 deg
MTHexapod.electrical WARNING: tel_electrical DDS read queue is filling: 20 of 100 elements
MTHexapod.electrical WARNING: tel_electrical DDS read queue is filling: 10 of 100 elements
MTHexapod.application WARNING: tel_application DDS read queue is filling: 10 of 100 elements
MTHexapod.application WARNING: tel_application DDS read queue is filling: 20 of 100 elements
MTHexapod.actuators WARNING: tel_actuators DDS read queue is filling: 20 of 100 elements
Moving elevation to 82.72 deg
MTHexapod.electrical WARNING: tel_electrical DDS read queue is filling: 10 of 100 elements
MTHexapod.electrical WARNING: tel_electrical DDS read queue is filling: 20 of 100 elements
MTHexapod.application WARNING: tel_application DDS read queue is filling: 10 of 100 elements
MTHexapod.application WARNING: tel_application DDS read queue is filling: 20 of 100 elements
MTHexapod.actuators WARNING: tel_actuators DDS read queue is filling: 19 of 100 elements
Moving elevation to 82.40 deg
MTHexapod.electrical WARNING: tel_electrical DDS read queue is filling: 20 of 100 elements
MTHexapod.electrical WARNING: tel_electrical DDS read queue is filling: 10 of 100 elements
MTHexapod.application WARNING: tel_application DDS read queue is filling: 20 of 100 elements
MTHexapod.application WARNING: tel_application DDS read queue is filling: 10 of 100 elements
MTHexapod.actuators WARNING: tel_actuators DDS read queue is filling: 20 of 100 elements
setup.MTCS DEBUG: Setting rotator to physical fixed position 0.0 deg. Rotator will not track.
MTHexapod.electrical WARNING: tel_electrical DDS read queue is filling: 10 of 100 elements
MTHexapod.electrical WARNING: tel_electrical DDS read queue is filling: 20 of 100 elements
MTHexapod.application WARNING: tel_application DDS read queue is filling: 10 of 100 elements
MTHexapod.application WARNING: tel_application DDS read queue is filling: 20 of 100 elements
MTHexapod.actuators WARNING: tel_actuators DDS read queue is filling: 20 of 100 elements
```

```
setup.MTCS DEBUG: Wait 5.0s for rotator to settle down.  
setup.MTCS DEBUG: Workaround for rotator trajectory problem. Moving rotator  
to its current position: 0.10  
setup.MTCS DEBUG: Wait for MTRotator in position event.  
setup.MTCS DEBUG: MTRotator in position: True.  
setup.MTCS DEBUG: MTRotator already in position. Handling potential race co  
ndition.  
setup.MTCS INFO: MTRotator in position: False.  
setup.MTCS INFO: MTRotator in position: True.  
setup.MTCS DEBUG: MTRotator in position True. Waiting settle time 5.0s  
setup.MTCS DEBUG: Sending slew command.  
setup.MTCS DEBUG: Scheduling check routines  
setup.MTCS DEBUG: process as completed...  
setup.MTCS DEBUG: Monitor position started.  
setup.MTCS DEBUG: Waiting for Target event from mtmount.  
setup.MTCS DEBUG: mtmount: <State.ENABLED: 2>  
setup.MTCS DEBUG: mtptg: <State.ENABLED: 2>  
setup.MTCS DEBUG: mtaos: <State.ENABLED: 2>  
setup.MTCS DEBUG: mtm1m3: <State.ENABLED: 2>  
setup.MTCS DEBUG: mtm2: <State.ENABLED: 2>  
setup.MTCS DEBUG: mthexapod_1: <State.ENABLED: 2>  
setup.MTCS DEBUG: mthexapod_2: <State.ENABLED: 2>  
setup.MTCS DEBUG: mtrotator: <State.ENABLED: 2>  
setup.MTCS DEBUG: mtdome: <State.ENABLED: 2>  
setup.MTCS DEBUG: mtdometrajectory: <State.ENABLED: 2>  
setup.MTCS DEBUG: Wait for mtmount in position events.  
setup.MTCS DEBUG: Wait for dome in position event.  
setup.MTCS DEBUG: Wait for MTRotator in position event.  
setup.MTCS DEBUG: MTRotator in position: True.  
setup.MTCS DEBUG: MTRotator already in position. Handling potential race co  
ndition.  
setup.MTCS DEBUG: Wait for MTMount elevation in position event.  
setup.MTCS DEBUG: MTMount elevation in position: True.  
setup.MTCS DEBUG: MTMount elevation already in position. Handling potential  
race condition.  
setup.MTCS DEBUG: Wait for MTMount azimuth in position event.  
setup.MTCS DEBUG: MTMount azimuth in position: True.  
setup.MTCS DEBUG: MTMount azimuth already in position. Handling potential r  
ace condition.  
setup.MTCS DEBUG: Mount target: private_revCode: bdcb00ba, private_sndStam  
p: 1655772079.7925835, private_rcvStamp: 1655772079.7928917, private_seqNu  
m: 24192, private_identity: MTMount, private_origin: 44621, elevation: 82.3  
9126044589153, elevationVelocity: -0.0006812114717610441, azimuth: 190.8806  
4866556502, azimuthVelocity: 0.024423437395212574, taiTime: 1655772079.8518  
202, trackId: 16, tracksys: SIDEREAL, radesys: ICRS, priority: 0  
setup.MTCS INFO: MTMount elevation in position: False.  
setup.MTCS INFO: MTMount azimuth in position: False.  
setup.MTCS INFO: MTMount elevation in position: True.  
setup.MTCS DEBUG: MTMount elevation in position True. Waiting settle time  
3.0s
```

```
setup.MTCS INFO: MTRotator in position: False.  
setup.MTCS INFO: MTMount azimuth in position: True.  
setup.MTCS DEBUG: MTMount azimuth in position True. Waiting settle time 3.0  
s  
setup.MTCS INFO: MTRotator in position: True.  
setup.MTCS DEBUG: MTRotator in position True. Waiting settle time 3.0s  
setup.MTCS DEBUG: [Tel]: Az = +190.500[ +0.4]; El = +082.400[ -0.0] [Ro  
t]: +000.100[ +0.0] [Dome] Az = +000.000; El = +000.000  
setup.MTCS DEBUG: Dome azimuth in position.  
setup.MTCS DEBUG: Dome elevation in position.  
setup.MTCS DEBUG: Stop tracking.  
MTHexapod.electrical ERROR: tel_electrical DDS read queue is full (100 elem  
ents); data may be lost  
MTHexapod.electrical ERROR: tel_electrical DDS read queue is full (100 elem  
ents); data may be lost  
MTPtg.timeAndDate ERROR: tel_timeAndDate DDS read queue is full (100 elemen  
ts); data may be lost  
MTMount.elevation ERROR: tel_elevation DDS read queue is full (100 element  
s); data may be lost  
MTRotator.rotation ERROR: tel_rotation DDS read queue is full (100 element  
s); data may be lost  
MTM1M3.powerSupplyData ERROR: tel_powerSupplyData DDS read queue is full (1  
00 elements); data may be lost  
MTHexapod.application ERROR: tel_application DDS read queue is full (100 el  
ements); data may be lost  
MTHexapod.application ERROR: tel_application DDS read queue is full (100 el  
ements); data may be lost  
MTMount.cameraCableWrap ERROR: tel_cameraCableWrap DDS read queue is full  
(100 elements); data may be lost  
MTM2.tangentEncoderPositions ERROR: tel_tangentEncoderPositions DDS read qu  
eue is full (100 elements); data may be lost  
MTRotator.motors ERROR: tel_motors DDS read queue is full (100 elements); d  
ata may be lost  
MTMount.azimuth ERROR: tel_azimuth DDS read queue is full (100 elements); d  
ata may be lost  
MTDome.azimuth ERROR: tel_azimuth DDS read queue is full (100 elements); da  
ta may be lost  
MTHexapod.actuators ERROR: tel_actuators DDS read queue is full (100 elemen  
ts); data may be lost  
MTPtg.mountStatus ERROR: tel_mountStatus DDS read queue is full (100 elemen  
ts); data may be lost  
MTMount.logevent_target ERROR: evt_target DDS read queue is full (100 eleme  
nts); data may be lost  
MTM2.powerStatus ERROR: tel_powerStatus DDS read queue is full (100 element  
s); data may be lost  
MTM1M3.pidData ERROR: tel_pidData DDS read queue is full (100 elements); da  
ta may be lost  
MTHexapod.logevent_heartbeat WARNING: evt_heartbeat DDS read queue is filli  
ng: 39 of 100 elements  
MTPtg.mountPosition ERROR: tel_mountPosition DDS read queue is full (100 el  
ements); data may be lost
```

```
MTHexapod.actuators ERROR: tel_actuators DDS read queue is full (100 elements); data may be lost
MTPtg.currentTargetStatus ERROR: tel_currentTargetStatus DDS read queue is full (100 elements); data may be lost
MTM2.positionIMS ERROR: tel_positionIMS DDS read queue is full (100 elements); data may be lost
MTDome.logevent_azMotion ERROR: evt_azMotion DDS read queue is full (100 elements); data may be lost
MTHexapod.logevent_heartbeat WARNING: evt_heartbeat DDS read queue is filling: 40 of 100 elements
MTM2.position ERROR: tel_position DDS read queue is full (100 elements); data may be lost
MTRotator.electrical ERROR: tel_electrical DDS read queue is full (100 elements); data may be lost
MTMount.logevent_cameraCableWrapTarget ERROR: evt_cameraCableWrapTarget DDS read queue is full (100 elements); data may be lost
MTRotator.ccwFollowingError ERROR: tel_ccwFollowingError DDS read queue is full (100 elements); data may be lost
MTM2.netMomentsTotal ERROR: tel_netMomentsTotal DDS read queue is full (100 elements); data may be lost
MTM1M3.outerLoopData ERROR: tel_outerLoopData DDS read queue is full (100 elements); data may be lost
MTRotator.logevent_target ERROR: evt_target DDS read queue is full (100 elements); data may be lost
MTM2.netForcesTotal ERROR: tel_netForcesTotal DDS read queue is full (100 elements); data may be lost
Gathering data - without Aberrations - End time: 2022-06-21T00:41:25.742
MTM2.ilcData ERROR: tel_ilcData DDS read queue is full (100 elements); data may be lost
MTM2.forceBalance ERROR: tel_forceBalance DDS read queue is full (100 elements); data may be lost
MTM2.displacementSensors ERROR: tel_displacementSensors DDS read queue is full (100 elements); data may be lost
MTM1M3.inclinometerData ERROR: tel_inclinometerData DDS read queue is full (100 elements); data may be lost
MTM2.axialEncoderPositions ERROR: tel_axialEncoderPositions DDS read queue is full (100 elements); data may be lost
MTM1M3.imsData ERROR: tel_imsData DDS read queue is full (100 elements); data may be lost
MTM1M3.hardpointMonitorData ERROR: tel_hardpointMonitorData DDS read queue is full (100 elements); data may be lost
MTM1M3.hardpointActuatorData ERROR: tel_hardpointActuatorData DDS read queue is full (100 elements); data may be lost
MTM1M3.forceActuatorData ERROR: tel_forceActuatorData DDS read queue is full (100 elements); data may be lost
MTM1M3.accelerometerData ERROR: tel_accelerometerData DDS read queue is full (100 elements); data may be lost
MTM1M3.logevent_forceActuatorWarning ERROR: evt_forceActuatorWarning DDS read queue is full (100 elements); data may be lost
MTM1M3.logevent_appliedThermalForces ERROR: evt_appliedThermalForces DDS read queue is full (100 elements); data may be lost
MTM1M3.logevent_appliedStaticForces ERROR: evt_appliedStaticForces DDS read queue is full (100 elements); data may be lost
```

```

MTM1M3.logevent_appliedForces ERROR: evt_appliedForces DDS read queue is full (100 elements); data may be lost
MTM1M3.logevent_appliedElevationForces ERROR: evt_appliedElevationForces DDS read queue is full (100 elements); data may be lost
MTM1M3.logevent_appliedCylinderForces ERROR: evt_appliedCylinderForces DDS read queue is full (100 elements); data may be lost
MTM1M3.logevent_appliedBalanceForces ERROR: evt_appliedBalanceForces DDS read queue is full (100 elements); data may be lost
MTM1M3.logevent_appliedAzimuthForces ERROR: evt_appliedAzimuthForces DDS read queue is full (100 elements); data may be lost
MTM1M3.logevent_appliedActiveOpticForces ERROR: evt_appliedActiveOpticForces DDS read queue is full (100 elements); data may be lost
MTM1M3.logevent_appliedAberrationForces ERROR: evt_appliedAberrationForces DDS read queue is full (100 elements); data may be lost

```

## Plot Optics vs Time

Plot the following as a function of time during the above process:

- mount elevation
- m1m3 actuator 101 z force
- m2 actuator B1 force
- camera hex y position
- m2 hex y position

```
In [73]: print(f"Gathering data - without Aberrations - Start time: {t_start_without_aberration}")
print(f"Gathering data - without Aberrations - End time: {t_end_without_aberration}")
```

Gathering data - without Aberrations - Start time: 2022-06-21T00:36:46.077  
Gathering data - without Aberrations - End time: 2022-06-21T00:41:25.742

```
In [74]: # Query telemetry
df = await get_data_from_efd(
    exec_info.loc,
    t_start_without_aberration,
    t_end_without_aberration)
```

```

MTHexapod.electrical WARNING: tel_electrical DDS read queue is filling: 11 of 100 elements
MTHexapod.electrical WARNING: tel_electrical DDS read queue is filling: 23 of 100 elements
MTHexapod.application WARNING: tel_application DDS read queue is filling: 12 of 100 elements
MTHexapod.application WARNING: tel_application DDS read queue is filling: 24 of 100 elements
MTHexapod.actuators WARNING: tel_actuators DDS read queue is filling: 11 of 100 elements
MTHexapod.actuators WARNING: tel_actuators DDS read queue is filling: 23 of 100 elements
MTM1M3.logevent_appliedCylinderForces ERROR: evt_appliedCylinderForces DDS read queue is full (100 elements); data may be lost
MTM1M3.logevent_appliedBalanceForces ERROR: evt_appliedBalanceForces DDS read queue is full (100 elements); data may be lost

```

```
MTM1M3.logevent_appliedAzimuthForces ERROR: evt_appliedAzimuthForces DDS read queue is full (100 elements); data may be lost
MTM1M3.logevent_appliedActiveOpticForces ERROR: evt_appliedActiveOpticForces DDS read queue is full (100 elements); data may be lost
MTM1M3.logevent_appliedAberrationForces ERROR: evt_appliedAberrationForces DDS read queue is full (100 elements); data may be lost
```

```
In [77]: fig, axs = plt.subplots(figsize=(10, 10), nrows=4, sharex=True)

axs[0].plot(df["mount_el"].dropna(), "k", label="Mount Elevation")
axs[0].set_ylabel("Mount El\n[deg]")

axs[1].plot(df["m1m3_z101"].dropna(), "C0o-", label="z101")
axs[1].set_ylabel("M1M3 Forces\n[--]")

# axs[2].plot(df["m2b1_applied"].dropna(), "C1-", label="applied")
# axs[2].plot(df["m2b1_gravLut"].dropna(), "C2-", label="Gravity LUT")
axs[2].plot(df["m2b1_measured"].dropna(), "C3-", label="Measured")
axs[2].set_ylabel("M2 Forces\n[--]")

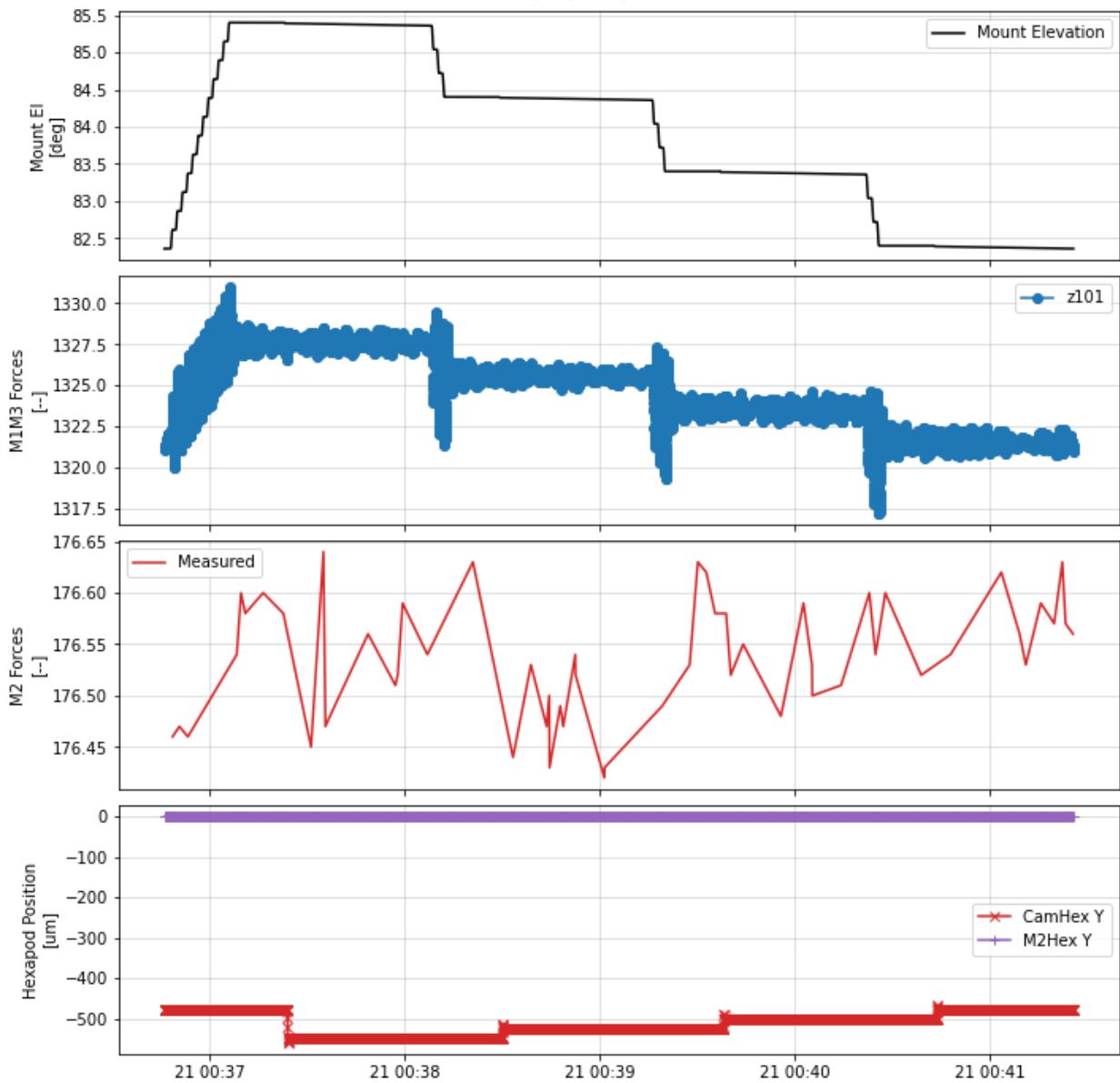
axs[3].plot(df["camhex_y"].dropna(), "C3x-", label="CamHex Y")
axs[3].plot(df["m2hex_y"].dropna(), "C4+-", label="M2Hex Y")
axs[3].set_ylabel("Hexapod Position\n[um]")

for ax in axs:
    ax.grid(":", alpha=0.5)
    ax.legend()

fig.suptitle(f"{test_execution} - M1M3/M2/Hexs/Elevation vs Time")
fig.tight_layout(h_pad=0.3)
fig.patch.set_facecolor('white')

fig.savefig(f"plots/{test_execution}_m1m3_m2_hexs_el_vs_time_without_aberr.png")
plt.show()
```

## LVV-D220620 - M1M3/M2/Hexs/Elevation vs Time



```

MTHexapod.electrical WARNING: tel_electrical DDS read queue is filling: 13
of 100 elements
MTHexapod.application WARNING: tel_application DDS read queue is filling: 1
4 of 100 elements
MTHexapod.actuators WARNING: tel_actuators DDS read queue is filling: 13 of
100 elements

```

## Gather Data - With Aberrations

Do 4 slews in sequence. For each slew,

2 seconds before the slew starts, use MTAOS to add some aberrations to the system. The aberrations should correspond to 1um of z4 (focus), z5(astigmatism), z7 (y-coma), and z9 (trefoil), respectively track for 39s, simulating a visit.

Note: the 4 slews need to correspond to elevation angle between 86.5 deg and 82 deg. And, additional margin is needed due to tracking.

```
In [24]: # We start at 85.4 deg because the track fails at 85.5 deg
target_elevations = [85.4, 84.4, 83.4, 82.4]
aberrations = [
    0, # z4 (focus)
    1, # z5 (astigmatism)
    3, # z7 (y-coma)
    5, # z9 (trefoil)
]

await mtcs.rem.mtaos.cmd_resetCorrection.start()
await mtcs.rem.mtaos.cmd_issueCorrection.start(timeout=60.)

t_start_with_aberration = Time.now()
t_start_with_aberration.format = "isot"
print(f"Gathering data - with Aberrations (reset every time) - Start time: {t_start_with_aberration}")

for _el, _ab in zip(target_elevations, aberrations):

    print(f"\n\n\nCurrent elevation: {_el} - current aberration z{_ab + 4}")

    # the input for addAberration is an array with 19 elements representing
    # the zernike coefficients starting at z4
    waveform_errors = np.zeros(19)
    waveform_errors[_ab] = 1.0 # um
    await mtcs.rem.mtaos.cmd_addAberration.set_start(wf=waveform_errors, timeout=60.)
    await mtcs.rem.mtaos.cmd_issueCorrection.start(timeout=60.)
    time.sleep(2.)

    az, el = await moveMountInElevationSteps(_el, azimuth=190.5)

    target = mtcs.radec_fromazel(az=az, el=el)
    await mtcs.slew_icrs(ra=target.ra, dec=target.dec, rot_type=RotType.Physical)

    # 39. seconds is the exposure time (2 * 15 sec) plus readout
    time.sleep(39.)
    await mtcs.stop_tracking()

    await mtcs.rem.mtaos.cmd_resetCorrection.start()
    await mtcs.rem.mtaos.cmd_issueCorrection.start(timeout=60.)

t_end_with_aberration = Time.now()
t_end_with_aberration.format = "isot"
print(f"Gathering data - with Aberrations (reset every time) - End time: {t_end_with_aberration}
```

Gathering data - with Aberrations (reset every time) - Start time: 2022-06-21T 01:51:30.700

```
Current elevation: 85.4 - current aberration z4
Moving elevation to 90.00 deg
MTM1M3.powerSupplyData ERROR: tel_powerSupplyData DDS read queue is full (100 elements); data may be lost
MTHexapod.electrical WARNING: tel_electrical DDS read queue is filling: 20 of 100 elements
MTHexapod.electrical WARNING: tel_electrical DDS read queue is filling: 40 of 100 elements
```

```
MTHexapod.application WARNING: tel_application DDS read queue is filling: 2
0 of 100 elements
MTHexapod.application WARNING: tel_application DDS read queue is filling: 4
0 of 100 elements
MTM1M3.pidData ERROR: tel_pidData DDS read queue is full (100 elements); da
ta may be lost
MTHexapod.actuators WARNING: tel_actuators DDS read queue is filling: 19 of
100 elements
MTHexapod.actuators WARNING: tel_actuators DDS read queue is filling: 39 of
100 elements
MTM1M3.outerLoopData ERROR: tel_outerLoopData DDS read queue is full (100 e
lements); data may be lost
MTM1M3.inclinometerData ERROR: tel_inclinometerData DDS read queue is full
(100 elements); data may be lost
Moving elevation to 89.74 deg
MTHexapod.electrical WARNING: tel_electrical DDS read queue is filling: 20
of 100 elements
MTHexapod.application WARNING: tel_application DDS read queue is filling: 2
0 of 100 elements
MTHexapod.actuators WARNING: tel_actuators DDS read queue is filling: 19 of
100 elements
MTM1M3.hardpointMonitorData ERROR: tel_hardpointMonitorData DDS read queue
is full (100 elements); data may be lost
MTM1M3.hardpointActuatorData ERROR: tel_hardpointActuatorData DDS read queu
e is full (100 elements); data may be lost
MTM1M3.forceActuatorData ERROR: tel_forceActuatorData DDS read queue is ful
l (100 elements); data may be lost
MTM1M3.accelerometerData ERROR: tel_accelerometerData DDS read queue is ful
l (100 elements); data may be lost
MTM1M3.logevent_appliedThermalForces ERROR: evt_appliedThermalForces DDS re
ad queue is full (100 elements); data may be lost
MTM1M3.logevent_appliedStaticForces ERROR: evt_appliedStaticForces DDS read
queue is full (100 elements); data may be lost
MTM1M3.logevent_appliedForces ERROR: evt_appliedForces DDS read queue is fu
ll (100 elements); data may be lost
MTM1M3.logevent_appliedElevationForces ERROR: evt_appliedElevationForces DD
S read queue is full (100 elements); data may be lost
MTM1M3.logevent_appliedCylinderForces ERROR: evt_appliedCylinderForces DDS
read queue is full (100 elements); data may be lost
Moving elevation to 89.49 deg
MTM1M3.logevent_appliedBalanceForces ERROR: evt_appliedBalanceForces DDS re
ad queue is full (100 elements); data may be lost
MTHexapod.electrical WARNING: tel_electrical DDS read queue is filling: 20
of 100 elements
MTHexapod.electrical WARNING: tel_electrical DDS read queue is filling: 10
of 100 elements
MTHexapod.application WARNING: tel_application DDS read queue is filling: 2
0 of 100 elements
MTHexapod.application WARNING: tel_application DDS read queue is filling: 1
0 of 100 elements
MTHexapod.actuators WARNING: tel_actuators DDS read queue is filling: 19 of
100 elements
```

```
MTM1M3.logevent_appliedAzimuthForces ERROR: evt_appliedAzimuthForces DDS re  
ad queue is full (100 elements); data may be lost  
MTM1M3.logevent_appliedActiveOpticForces ERROR: evt_appliedActiveOpticForces DDS read queue is full (100 elements); data may be lost  
MTM1M3.logevent_appliedAberrationForces ERROR: evt_appliedAberrationForces DDS read queue is full (100 elements); data may be lost  
Moving elevation to 89.23 deg  
MTHexapod.electrical WARNING: tel_electrical DDS read queue is filling: 20 of 100 elements  
MTHexapod.electrical WARNING: tel_electrical DDS read queue is filling: 10 of 100 elements  
MTHexapod.application WARNING: tel_application DDS read queue is filling: 20 of 100 elements  
MTHexapod.application WARNING: tel_application DDS read queue is filling: 10 of 100 elements  
MTHexapod.actuators WARNING: tel_actuators DDS read queue is filling: 22 of 100 elements  
MTHexapod.actuators WARNING: tel_actuators DDS read queue is filling: 10 of 100 elements  
Moving elevation to 88.98 deg  
MTHexapod.electrical WARNING: tel_electrical DDS read queue is filling: 20 of 100 elements  
MTHexapod.application WARNING: tel_application DDS read queue is filling: 10 of 100 elements  
MTHexapod.application WARNING: tel_application DDS read queue is filling: 20 of 100 elements  
MTHexapod.actuators WARNING: tel_actuators DDS read queue is filling: 20 of 100 elements  
Moving elevation to 88.72 deg  
MTHexapod.electrical WARNING: tel_electrical DDS read queue is filling: 10 of 100 elements  
MTHexapod.electrical WARNING: tel_electrical DDS read queue is filling: 20 of 100 elements  
MTHexapod.application WARNING: tel_application DDS read queue is filling: 10 of 100 elements  
MTHexapod.application WARNING: tel_application DDS read queue is filling: 20 of 100 elements  
MTHexapod.actuators WARNING: tel_actuators DDS read queue is filling: 20 of 100 elements  
Moving elevation to 88.47 deg  
MTHexapod.electrical WARNING: tel_electrical DDS read queue is filling: 20 of 100 elements  
MTHexapod.electrical WARNING: tel_electrical DDS read queue is filling: 10 of 100 elements  
MTHexapod.application WARNING: tel_application DDS read queue is filling: 20 of 100 elements  
MTHexapod.application WARNING: tel_application DDS read queue is filling: 10 of 100 elements  
MTHexapod.actuators WARNING: tel_actuators DDS read queue is filling: 20 of 100 elements  
Moving elevation to 88.21 deg  
MTHexapod.electrical WARNING: tel_electrical DDS read queue is filling: 10 of 100 elements
```

```
MTHexapod.electrical WARNING: tel_electrical DDS read queue is filling: 20  
of 100 elements  
MTHexapod.application WARNING: tel_application DDS read queue is filling: 1  
0 of 100 elements  
MTHexapod.application WARNING: tel_application DDS read queue is filling: 2  
0 of 100 elements  
MTHexapod.actuators WARNING: tel_actuators DDS read queue is filling: 20 of  
100 elements  
Moving elevation to 87.96 deg  
MTHexapod.electrical WARNING: tel_electrical DDS read queue is filling: 10  
of 100 elements  
MTHexapod.electrical WARNING: tel_electrical DDS read queue is filling: 20  
of 100 elements  
MTHexapod.application WARNING: tel_application DDS read queue is filling: 1  
0 of 100 elements  
MTHexapod.application WARNING: tel_application DDS read queue is filling: 2  
0 of 100 elements  
MTHexapod.actuators WARNING: tel_actuators DDS read queue is filling: 19 of  
100 elements  
Moving elevation to 87.70 deg  
MTHexapod.electrical WARNING: tel_electrical DDS read queue is filling: 10  
of 100 elements  
MTHexapod.electrical WARNING: tel_electrical DDS read queue is filling: 20  
of 100 elements  
MTHexapod.application WARNING: tel_application DDS read queue is filling: 1  
0 of 100 elements  
MTHexapod.application WARNING: tel_application DDS read queue is filling: 2  
0 of 100 elements  
MTHexapod.actuators WARNING: tel_actuators DDS read queue is filling: 19 of  
100 elements  
MTHexapod.actuators WARNING: tel_actuators DDS read queue is filling: 11 of  
100 elements  
Moving elevation to 87.44 deg  
MTHexapod.electrical WARNING: tel_electrical DDS read queue is filling: 10  
of 100 elements  
MTHexapod.electrical WARNING: tel_electrical DDS read queue is filling: 20  
of 100 elements  
MTHexapod.application WARNING: tel_application DDS read queue is filling: 1  
0 of 100 elements  
MTHexapod.application WARNING: tel_application DDS read queue is filling: 2  
0 of 100 elements  
MTHexapod.actuators WARNING: tel_actuators DDS read queue is filling: 19 of  
100 elements  
Moving elevation to 87.19 deg  
MTHexapod.electrical WARNING: tel_electrical DDS read queue is filling: 10  
of 100 elements  
MTHexapod.electrical WARNING: tel_electrical DDS read queue is filling: 20  
of 100 elements  
MTHexapod.application WARNING: tel_application DDS read queue is filling: 1  
0 of 100 elements  
MTHexapod.application WARNING: tel_application DDS read queue is filling: 2  
0 of 100 elements
```

```
MTHexapod.actuators WARNING: tel_actuators DDS read queue is filling: 19 of
100 elements
Moving elevation to 86.93 deg
MTHexapod.electrical WARNING: tel_electrical DDS read queue is filling: 20
of 100 elements
MTHexapod.electrical WARNING: tel_electrical DDS read queue is filling: 10
of 100 elements
MTHexapod.application WARNING: tel_application DDS read queue is filling: 1
0 of 100 elements
MTHexapod.application WARNING: tel_application DDS read queue is filling: 2
1 of 100 elements
MTHexapod.actuators WARNING: tel_actuators DDS read queue is filling: 20 of
100 elements
Moving elevation to 86.68 deg
MTHexapod.electrical WARNING: tel_electrical DDS read queue is filling: 20
of 100 elements
MTHexapod.electrical WARNING: tel_electrical DDS read queue is filling: 10
of 100 elements
MTHexapod.application WARNING: tel_application DDS read queue is filling: 2
0 of 100 elements
MTHexapod.application WARNING: tel_application DDS read queue is filling: 1
0 of 100 elements
MTHexapod.actuators WARNING: tel_actuators DDS read queue is filling: 10 of
100 elements
MTHexapod.actuators WARNING: tel_actuators DDS read queue is filling: 20 of
100 elements
Moving elevation to 86.42 deg
MTHexapod.electrical WARNING: tel_electrical DDS read queue is filling: 10
of 100 elements
MTHexapod.electrical WARNING: tel_electrical DDS read queue is filling: 20
of 100 elements
MTHexapod.application WARNING: tel_application DDS read queue is filling: 1
0 of 100 elements
MTHexapod.application WARNING: tel_application DDS read queue is filling: 2
0 of 100 elements
MTHexapod.actuators WARNING: tel_actuators DDS read queue is filling: 20 of
100 elements
Moving elevation to 86.17 deg
MTHexapod.electrical WARNING: tel_electrical DDS read queue is filling: 20
of 100 elements
MTHexapod.electrical WARNING: tel_electrical DDS read queue is filling: 10
of 100 elements
MTHexapod.application WARNING: tel_application DDS read queue is filling: 2
0 of 100 elements
MTHexapod.application WARNING: tel_application DDS read queue is filling: 1
0 of 100 elements
MTHexapod.actuators WARNING: tel_actuators DDS read queue is filling: 19 of
100 elements
Moving elevation to 85.91 deg
MTHexapod.electrical WARNING: tel_electrical DDS read queue is filling: 20
of 100 elements
MTHexapod.electrical WARNING: tel_electrical DDS read queue is filling: 10
of 100 elements
```

```
MTHexapod.application WARNING: tel_application DDS read queue is filling: 2
0 of 100 elements
MTHexapod.application WARNING: tel_application DDS read queue is filling: 1
0 of 100 elements
MTHexapod.actuators WARNING: tel_actuators DDS read queue is filling: 19 of
100 elements
Moving elevation to 85.66 deg
MTHexapod.electrical WARNING: tel_electrical DDS read queue is filling: 20
of 100 elements
MTHexapod.application WARNING: tel_application DDS read queue is filling: 1
0 of 100 elements
MTHexapod.application WARNING: tel_application DDS read queue is filling: 2
0 of 100 elements
MTHexapod.actuators WARNING: tel_actuators DDS read queue is filling: 19 of
100 elements
Moving elevation to 85.40 deg
MTHexapod.electrical WARNING: tel_electrical DDS read queue is filling: 20
of 100 elements
MTHexapod.electrical WARNING: tel_electrical DDS read queue is filling: 10
of 100 elements
MTHexapod.application WARNING: tel_application DDS read queue is filling: 2
0 of 100 elements
MTHexapod.application WARNING: tel_application DDS read queue is filling: 1
0 of 100 elements
MTHexapod.actuators WARNING: tel_actuators DDS read queue is filling: 19 of
100 elements
MTHexapod.actuators WARNING: tel_actuators DDS read queue is filling: 10 of
100 elements
setup.MTCS DEBUG: Setting rotator to physical fixed position 0.0 deg. Rotat
or will not track.
MTHexapod.electrical WARNING: tel_electrical DDS read queue is filling: 16
of 100 elements
MTHexapod.electrical WARNING: tel_electrical DDS read queue is filling: 32
of 100 elements
MTHexapod.application WARNING: tel_application DDS read queue is filling: 1
7 of 100 elements
MTHexapod.application WARNING: tel_application DDS read queue is filling: 3
3 of 100 elements
MTHexapod.actuators WARNING: tel_actuators DDS read queue is filling: 16 of
100 elements
MTHexapod.actuators WARNING: tel_actuators DDS read queue is filling: 32 of
100 elements
setup.MTCS DEBUG: Wait 5.0s for rotator to settle down.
MTM1M3.logevent_appliedForces ERROR: evt_appliedForces DDS read queue is fu
ll (100 elements); data may be lost
MTM1M3.logevent_appliedElevationForces ERROR: evt_appliedElevationForces DD
S read queue is full (100 elements); data may be lost
MTM1M3.logevent_appliedCylinderForces ERROR: evt_appliedCylinderForces DDS
read queue is full (100 elements); data may be lost
MTM1M3.logevent_appliedBalanceForces ERROR: evt_appliedBalanceForces DDS re
ad queue is full (100 elements); data may be lost
MTM1M3.logevent_appliedAzimuthForces ERROR: evt_appliedAzimuthForces DDS re
ad queue is full (100 elements); data may be lost
```

```
MTM1M3.logevent_appliedActiveOpticForces ERROR: evt_appliedActiveOpticForce
s DDS read queue is full (100 elements); data may be lost
MTM1M3.logevent_appliedAberrationForces ERROR: evt_appliedAberrationForces
DDS read queue is full (100 elements); data may be lost
setup.MTCS DEBUG: Workaround for rotator trajectory problem. Moving rotator
to its current position: 0.10
setup.MTCS DEBUG: Wait for MTRotator in position event.
setup.MTCS DEBUG: MTRotator in position: False.
setup.MTCS INFO: MTRotator in position: True.
setup.MTCS DEBUG: MTRotator in position True. Waiting settle time 5.0s
setup.MTCS DEBUG: Sending slew command.
setup.MTCS DEBUG: Scheduling check routines
setup.MTCS DEBUG: process as completed...
setup.MTCS DEBUG: Monitor position started.
setup.MTCS DEBUG: Waiting for Target event from mtmount.
setup.MTCS DEBUG: mtmount: <State.ENABLED: 2>
setup.MTCS DEBUG: mpttg: <State.ENABLED: 2>
setup.MTCS DEBUG: mtaos: <State.ENABLED: 2>
setup.MTCS DEBUG: mtm1m3: <State.ENABLED: 2>
setup.MTCS DEBUG: mtm2: <State.ENABLED: 2>
setup.MTCS DEBUG: mthexapod_1: <State.ENABLED: 2>
setup.MTCS DEBUG: mthexapod_2: <State.ENABLED: 2>
setup.MTCS DEBUG: mtrotator: <State.ENABLED: 2>
setup.MTCS DEBUG: mtdome: <State.ENABLED: 2>
setup.MTCS DEBUG: mtodometajectory: <State.ENABLED: 2>
setup.MTCS DEBUG: Wait for mtmount in position events.
setup.MTCS DEBUG: Wait for dome in position event.
setup.MTCS DEBUG: Wait for MTRotator in position event.
setup.MTCS DEBUG: MTRotator in position: True.
setup.MTCS DEBUG: MTRotator already in position. Handling potential race co
ndition.
setup.MTCS DEBUG: Wait for MTMount elevation in position event.
setup.MTCS DEBUG: MTMount elevation in position: True.
setup.MTCS DEBUG: MTMount elevation already in position. Handling potential r
ace condition.
setup.MTCS DEBUG: Wait for MTMount azimuth in position event.
setup.MTCS DEBUG: MTMount azimuth in position: True.
setup.MTCS DEBUG: MTMount azimuth already in position. Handling potential r
ace condition.
setup.MTCS DEBUG: Mount target: private_revCode: bdcb00ba, private_sndStam
p: 1655776376.2005646, private_rcvStamp: 1655776376.2009425, private_seqNu
m: 34549, private_identity: MTMount, private_origin: 44621, elevation: 85.3
9034406266113, elevationVelocity: -0.0006985488144044956, azimuth: 191.1606
3971458345, azimuthVelocity: 0.041805043156403904, taiTime: 1655776376.2598
116, trackId: 1, tracksys: SIDEREAL, radesys: ICRS, priority: 0
setup.MTCS INFO: MTMount elevation in position: False.
setup.MTCS INFO: MTMount azimuth in position: False.
setup.MTCS INFO: MTMount elevation in position: True.
setup.MTCS DEBUG: MTMount elevation in position True. Waiting settle time
3.0s
```

```
setup.MTCS INFO: MTRotator in position: False.  
setup.MTCS INFO: MTMount azimuth in position: True.  
setup.MTCS DEBUG: MTMount azimuth in position True. Waiting settle time 3.0  
s  
setup.MTCS DEBUG: [Tel]: Az = +190.508[ +0.7]; El = +085.396[ -0.0] [Ro  
t]: +000.100[ +0.0] [Dome] Az = +000.000; El = +000.000  
setup.MTCS DEBUG: Dome azimuth in position.  
setup.MTCS DEBUG: Dome elevation in position.  
setup.MTCS INFO: MTRotator in position: True.  
setup.MTCS DEBUG: MTRotator in position True. Waiting settle time 3.0s  
setup.MTCS DEBUG: Stop tracking.  
MTM1M3.powerSupplyData ERROR: tel_powerSupplyData DDS read queue is full (1  
00 elements); data may be lost  
MTMount.elevation ERROR: tel_elevation DDS read queue is full (100 element  
s); data may be lost  
MTHexapod.electrical ERROR: tel_electrical DDS read queue is full (100 elem  
ents); data may be lost  
MTRotator.rotation ERROR: tel_rotation DDS read queue is full (100 element  
s); data may be lost  
MTPtg.timeAndDate ERROR: tel_timeAndDate DDS read queue is full (100 elemen  
ts); data may be lost  
MTHexapod.electrical ERROR: tel_electrical DDS read queue is full (100 elem  
ents); data may be lost  
MTHexapod.application ERROR: tel_application DDS read queue is full (100 el  
ements); data may be lost  
MTM2.tangentEncoderPositions ERROR: tel_tangentEncoderPositions DDS read qu  
ue is full (100 elements); data may be lost  
MTMount.cameraCableWrap ERROR: tel_cameraCableWrap DDS read queue is full  
(100 elements); data may be lost  
MTHexapod.application ERROR: tel_application DDS read queue is full (100 el  
ements); data may be lost  
MTRotator.motors ERROR: tel_motors DDS read queue is full (100 elements); d  
ata may be lost  
MTM1M3.pidData ERROR: tel_pidData DDS read queue is full (100 elements); da  
ta may be lost  
MTPtg.mountStatus ERROR: tel_mountStatus DDS read queue is full (100 elemen  
ts); data may be lost  
MTMount.azimuth ERROR: tel_azimuth DDS read queue is full (100 elements); d  
ata may be lost  
MTDome.azimuth ERROR: tel_azimuth DDS read queue is full (100 elements); da  
ta may be lost  
MTHexapod.actuators ERROR: tel_actuators DDS read queue is full (100 elemen  
ts); data may be lost  
MTHexapod.actuators ERROR: tel_actuators DDS read queue is full (100 elemen  
ts); data may be lost  
MTM2.powerStatus ERROR: tel_powerStatus DDS read queue is full (100 element  
s); data may be lost  
MTPtg.mountPosition ERROR: tel_mountPosition DDS read queue is full (100 el  
ements); data may be lost  
MTHexapod.logevent_heartbeat WARNING: evt_heartbeat DDS read queue is filli  
ng: 39 of 100 elements
```

```
MTM2.positionIMS ERROR: tel_positionIMS DDS read queue is full (100 elements); data may be lost
MTPtg.currentTargetStatus ERROR: tel_currentTargetStatus DDS read queue is full (100 elements); data may be lost
MTM2.position ERROR: tel_position DDS read queue is full (100 elements); data may be lost
MTDome.logevent_azMotion ERROR: evt_azMotion DDS read queue is full (100 elements); data may be lost
MTHexapod.logevent_heartbeat WARNING: evt_heartbeat DDS read queue is filling: 39 of 100 elements
MTM2.netMomentsTotal ERROR: tel_netMomentsTotal DDS read queue is full (100 elements); data may be lost
MTM1M3.outerLoopData ERROR: tel_outerLoopData DDS read queue is full (100 elements); data may be lost
MTRotator.electrical ERROR: tel_electrical DDS read queue is full (100 elements); data may be lost
MTMount.logevent_target ERROR: evt_target DDS read queue is full (100 elements); data may be lost
MTRotator.ccwFollowingError ERROR: tel_ccwFollowingError DDS read queue is full (100 elements); data may be lost
MTRotator.logevent_target ERROR: evt_target DDS read queue is full (100 elements); data may be lost
MTM2.netForcesTotal ERROR: tel_netForcesTotal DDS read queue is full (100 elements); data may be lost
MTM1M3.inclinometerData ERROR: tel_inclinometerData DDS read queue is full (100 elements); data may be lost
MTMount.logevent_cameraCableWrapTarget ERROR: evt_cameraCableWrapTarget DDS read queue is full (100 elements); data may be lost
MTM2.ilcData ERROR: tel_ilcData DDS read queue is full (100 elements); data may be lost
MTM2.forceBalance ERROR: tel_forceBalance DDS read queue is full (100 elements); data may be lost
MTM2.displacementSensors ERROR: tel_displacementSensors DDS read queue is full (100 elements); data may be lost
MTM1M3.imsData ERROR: tel_imsData DDS read queue is full (100 elements); data may be lost
MTM1M3.hardpointMonitorData ERROR: tel_hardpointMonitorData DDS read queue is full (100 elements); data may be lost
MTM2.axialEncoderPositions ERROR: tel_axialEncoderPositions DDS read queue is full (100 elements); data may be lost
MTM1M3.hardpointActuatorData ERROR: tel_hardpointActuatorData DDS read queue is full (100 elements); data may be lost
MTM1M3.forceActuatorData ERROR: tel_forceActuatorData DDS read queue is full (100 elements); data may be lost
MTM1M3.accelerometerData ERROR: tel_accelerometerData DDS read queue is full (100 elements); data may be lost
MTM1M3.logevent_forceActuatorWarning ERROR: evt_forceActuatorWarning DDS read queue is full (100 elements); data may be lost
MTM1M3.logevent_appliedThermalForces ERROR: evt_appliedThermalForces DDS read queue is full (100 elements); data may be lost
MTM1M3.logevent_appliedStaticForces ERROR: evt_appliedStaticForces DDS read queue is full (100 elements); data may be lost
```

| MTM1M3.logevent\_appliedForces ERROR: evt\_appliedForces DDS read queue is full (100 elements); data may be lost

Current elevation: 84.4 - current aberration z5  
| MTM1M3.logevent\_appliedElevationForces ERROR: evt\_appliedElevationForces DDS read queue is full (100 elements); data may be lost  
| MTM1M3.logevent\_appliedCylinderForces ERROR: evt\_appliedCylinderForces DDS read queue is full (100 elements); data may be lost  
| MTM1M3.logevent\_appliedBalanceForces ERROR: evt\_appliedBalanceForces DDS read queue is full (100 elements); data may be lost  
| MTM1M3.logevent\_appliedAzimuthForces ERROR: evt\_appliedAzimuthForces DDS read queue is full (100 elements); data may be lost  
| MTM1M3.logevent\_appliedActiveOpticForces ERROR: evt\_appliedActiveOpticForces DDS read queue is full (100 elements); data may be lost  
| MTM1M3.logevent\_appliedAberrationForces ERROR: evt\_appliedAberrationForces DDS read queue is full (100 elements); data may be lost  
Moving elevation to 85.36 deg  
| MTHexapod.electrical WARNING: tel\_electrical DDS read queue is filling: 20 of 100 elements  
| MTM1M3.powerSupplyData ERROR: tel\_powerSupplyData DDS read queue is full (100 elements); data may be lost  
| MTHexapod.electrical WARNING: tel\_electrical DDS read queue is filling: 40 of 100 elements  
| MTHexapod.application WARNING: tel\_application DDS read queue is filling: 20 of 100 elements  
| MTHexapod.application WARNING: tel\_application DDS read queue is filling: 40 of 100 elements  
| MTHexapod.actuators WARNING: tel\_actuators DDS read queue is filling: 20 of 100 elements  
| MTM1M3.pidData ERROR: tel\_pidData DDS read queue is full (100 elements); data may be lost  
| MTHexapod.actuators WARNING: tel\_actuators DDS read queue is filling: 39 of 100 elements  
| MTM1M3.outerLoopData ERROR: tel\_outerLoopData DDS read queue is full (100 elements); data may be lost  
| MTM1M3.inclinometerData ERROR: tel\_inclinometerData DDS read queue is full (100 elements); data may be lost  
| MTM1M3.hardpointMonitorData ERROR: tel\_hardpointMonitorData DDS read queue is full (100 elements); data may be lost  
| MTM1M3.hardpointActuatorData ERROR: tel\_hardpointActuatorData DDS read queue is full (100 elements); data may be lost  
| MTM1M3.forceActuatorData ERROR: tel\_forceActuatorData DDS read queue is full (100 elements); data may be lost  
| MTM1M3.accelerometerData ERROR: tel\_accelerometerData DDS read queue is full (100 elements); data may be lost  
| MTM1M3.logevent\_appliedThermalForces ERROR: evt\_appliedThermalForces DDS read queue is full (100 elements); data may be lost  
| MTM1M3.logevent\_appliedStaticForces ERROR: evt\_appliedStaticForces DDS read queue is full (100 elements); data may be lost  
| MTM1M3.logevent\_appliedForces ERROR: evt\_appliedForces DDS read queue is full (100 elements); data may be lost

```
MTM1M3.logevent_appliedElevationForces ERROR: evt_appliedElevationForces DDS
S read queue is full (100 elements); data may be lost
MTM1M3.logevent_appliedCylinderForces ERROR: evt_appliedCylinderForces DDS
read queue is full (100 elements); data may be lost
MTM1M3.logevent_appliedBalanceForces ERROR: evt_appliedBalanceForces DDS re
ad queue is full (100 elements); data may be lost
MTM1M3.logevent_appliedAzimuthForces ERROR: evt_appliedAzimuthForces DDS re
ad queue is full (100 elements); data may be lost
MTM1M3.logevent_appliedActiveOpticForces ERROR: evt_appliedActiveOpticForce
s DDS read queue is full (100 elements); data may be lost
MTM1M3.logevent_appliedAberrationForces ERROR: evt_appliedAberrationForces
DDS read queue is full (100 elements); data may be lost
Moving elevation to 85.04 deg
MTHexapod.electrical WARNING: tel_electrical DDS read queue is filling: 20
of 100 elements
MTHexapod.electrical WARNING: tel_electrical DDS read queue is filling: 10
of 100 elements
MTHexapod.application WARNING: tel_application DDS read queue is filling: 2
0 of 100 elements
MTHexapod.application WARNING: tel_application DDS read queue is filling: 1
0 of 100 elements
MTHexapod.actuators WARNING: tel_actuators DDS read queue is filling: 19 of
100 elements
Moving elevation to 84.72 deg
MTHexapod.electrical WARNING: tel_electrical DDS read queue is filling: 10
of 100 elements
MTHexapod.electrical WARNING: tel_electrical DDS read queue is filling: 20
of 100 elements
MTHexapod.application WARNING: tel_application DDS read queue is filling: 1
0 of 100 elements
MTHexapod.application WARNING: tel_application DDS read queue is filling: 2
0 of 100 elements
MTHexapod.actuators WARNING: tel_actuators DDS read queue is filling: 19 of
100 elements
MTHexapod.actuators WARNING: tel_actuators DDS read queue is filling: 10 of
100 elements
Moving elevation to 84.40 deg
MTHexapod.electrical WARNING: tel_electrical DDS read queue is filling: 20
of 100 elements
MTHexapod.electrical WARNING: tel_electrical DDS read queue is filling: 10
of 100 elements
MTHexapod.application WARNING: tel_application DDS read queue is filling: 2
0 of 100 elements
MTHexapod.application WARNING: tel_application DDS read queue is filling: 1
0 of 100 elements
MTHexapod.actuators WARNING: tel_actuators DDS read queue is filling: 19 of
100 elements
setup.MTCS DEBUG: Setting rotator to physical fixed position 0.0 deg. Rotat
or will not track.
MTHexapod.electrical WARNING: tel_electrical DDS read queue is filling: 20
of 100 elements
MTHexapod.electrical WARNING: tel_electrical DDS read queue is filling: 10
of 100 elements
```

```
MTHexapod.application WARNING: tel_application DDS read queue is filling: 1
0 of 100 elements
MTHexapod.application WARNING: tel_application DDS read queue is filling: 2
1 of 100 elements
MTHexapod.actuators WARNING: tel_actuators DDS read queue is filling: 20 of
100 elements
setup.MTCS DEBUG: Wait 5.0s for rotator to settle down.
setup.MTCS DEBUG: Workaround for rotator trajectory problem. Moving rotator
to its current position: 0.10
setup.MTCS DEBUG: Wait for MTRotator in position event.
setup.MTCS DEBUG: MTRotator in position: True.
setup.MTCS DEBUG: MTRotator already in position. Handling potential race co
ndition.
setup.MTCS INFO: MTRotator in position: False.
setup.MTCS INFO: MTRotator in position: True.
setup.MTCS DEBUG: MTRotator in position True. Waiting settle time 5.0s
setup.MTCS DEBUG: Sending slew command.
setup.MTCS DEBUG: Scheduling check routines
setup.MTCS DEBUG: process as completed...
setup.MTCS DEBUG: Monitor position started.
setup.MTCS DEBUG: Waiting for Target event from mtmount.
setup.MTCS DEBUG: mtmount: <State.ENABLED: 2>
setup.MTCS DEBUG: mpttg: <State.ENABLED: 2>
setup.MTCS DEBUG: mtaos: <State.ENABLED: 2>
setup.MTCS DEBUG: mtm1m3: <State.ENABLED: 2>
setup.MTCS DEBUG: mtm2: <State.ENABLED: 2>
setup.MTCS DEBUG: mthexapod_1: <State.ENABLED: 2>
setup.MTCS DEBUG: mthexapod_2: <State.ENABLED: 2>
setup.MTCS DEBUG: mtrotator: <State.ENABLED: 2>
setup.MTCS DEBUG: mtdome: <State.ENABLED: 2>
setup.MTCS DEBUG: mtodometajectory: <State.ENABLED: 2>
setup.MTCS DEBUG: Wait for mtmount in position events.
setup.MTCS DEBUG: Wait for dome in position event.
setup.MTCS DEBUG: Wait for MTRotator in position event.
setup.MTCS DEBUG: MTRotator in position: True.
setup.MTCS DEBUG: MTRotator already in position. Handling potential race co
ndition.
setup.MTCS DEBUG: Wait for MTMount elevation in position event.
setup.MTCS DEBUG: MTMount elevation in position: True.
setup.MTCS DEBUG: MTMount elevation already in position. Handling potential
race condition.
setup.MTCS DEBUG: Wait for MTMount azimuth in position event.
setup.MTCS DEBUG: MTMount azimuth in position: True.
setup.MTCS DEBUG: MTMount azimuth already in position. Handling potential r
ace condition.
setup.MTCS DEBUG: Mount target: private_revCode: bdcb00ba, private_sndStam
p: 1655776447.3890045, private_rcvStamp: 1655776447.3893418, private_seqNu
m: 35440, private_identity: MTMount, private_origin: 44621, elevation: 84.3
9072749519325, elevationVelocity: -0.0006905266657001776, azimuth: 191.0310
4277000025, azimuthVelocity: 0.03395849437861631, taiTime: 1655776447.44829
46, trackId: 2, tracksys: SIDEREAL, radesys: ICRS, priority: 0
```

```
setup.MTCS INFO: MTMount elevation in position: False.  
setup.MTCS INFO: MTMount azimuth in position: False.  
setup.MTCS INFO: MTMount elevation in position: True.  
setup.MTCS DEBUG: MTMount elevation in position True. Waiting settle time  
3.0s  
setup.MTCS DEBUG: [Tel]: Az = +190.508[ +0.5]; El = +084.396[ -0.0] [Ro  
t]: +000.100[ -0.0] [Dome] Az = +000.000; El = +000.000  
setup.MTCS DEBUG: Dome azimuth in position.  
setup.MTCS DEBUG: Dome elevation in position.  
setup.MTCS INFO: MTRotator in position: False.  
setup.MTCS INFO: MTRotator in position: True.  
setup.MTCS DEBUG: MTRotator in position True. Waiting settle time 3.0s  
setup.MTCS INFO: MTMount azimuth in position: True.  
setup.MTCS DEBUG: MTMount azimuth in position True. Waiting settle time 3.0  
s  
setup.MTCS DEBUG: Stop tracking.  
MTPtg.timeAndDate ERROR: tel_timeAndDate DDS read queue is full (100 elem  
ts); data may be lost  
MTM1M3.powerSupplyData ERROR: tel_powerSupplyData DDS read queue is full (1  
00 elements); data may be lost  
MTMount.elevation ERROR: tel_elevation DDS read queue is full (100 element  
s); data may be lost  
MTHexapod.electrical ERROR: tel_electrical DDS read queue is full (100 elem  
ents); data may be lost  
MTRotator.rotation ERROR: tel_rotation DDS read queue is full (100 element  
s); data may be lost  
MTHexapod.electrical ERROR: tel_electrical DDS read queue is full (100 elem  
ents); data may be lost  
MTM1M3.pidData ERROR: tel_pidData DDS read queue is full (100 elements); da  
ta may be lost  
MTMount.cameraCableWrap ERROR: tel_cameraCableWrap DDS read queue is full  
(100 elements); data may be lost  
MTM2.tangentEncoderPositions ERROR: tel_tangentEncoderPositions DDS read qu  
eue is full (100 elements); data may be lost  
MTRotator.motors ERROR: tel_motors DDS read queue is full (100 elements); d  
ata may be lost  
MTHexapod.application ERROR: tel_application DDS read queue is full (100 el  
ements); data may be lost  
MTHexapod.application ERROR: tel_application DDS read queue is full (100 el  
ements); data may be lost  
MTPtg.mountStatus ERROR: tel_mountStatus DDS read queue is full (100 elem  
ts); data may be lost  
MTDome.azimuth ERROR: tel_azimuth DDS read queue is full (100 elements); da  
ta may be lost  
MTM2.powerStatus ERROR: tel_powerStatus DDS read queue is full (100 element  
s); data may be lost  
MTHexapod.actuators ERROR: tel_actuators DDS read queue is full (100 elem  
ents); data may be lost  
MTPtg.mountPosition ERROR: tel_mountPosition DDS read queue is full (100 el  
ements); data may be lost  
MTMount.azimuth ERROR: tel_azimuth DDS read queue is full (100 elements); d  
ata may be lost
```

```
MTPtg.currentTargetStatus ERROR: tel_currentTargetStatus DDS read queue is full (100 elements); data may be lost
MTM2.positionIMS ERROR: tel_positionIMS DDS read queue is full (100 elements); data may be lost
MTMount.logevent_target ERROR: evt_target DDS read queue is full (100 elements); data may be lost
MTHexapod.actuators ERROR: tel_actuators DDS read queue is full (100 elements); data may be lost
MTDome.logevent_azMotion ERROR: evt_azMotion DDS read queue is full (100 elements); data may be lost
MTM2.position ERROR: tel_position DDS read queue is full (100 elements); data may be lost
MTHexapod.logevent_heartbeat WARNING: evt_heartbeat DDS read queue is filling: 39 of 100 elements
MTHexapod.logevent_heartbeat WARNING: evt_heartbeat DDS read queue is filling: 39 of 100 elements
MTM2.netMomentsTotal ERROR: tel_netMomentsTotal DDS read queue is full (100 elements); data may be lost
MTRotator.electrical ERROR: tel_electrical DDS read queue is full (100 elements); data may be lost
MTM1M3.outerLoopData ERROR: tel_outerLoopData DDS read queue is full (100 elements); data may be lost
MTM2.netForcesTotal ERROR: tel_netForcesTotal DDS read queue is full (100 elements); data may be lost
MTRotator.ccwFollowingError ERROR: tel_ccwFollowingError DDS read queue is full (100 elements); data may be lost
MTMount.logevent_cameraCableWrapTarget ERROR: evt_cameraCableWrapTarget DDS read queue is full (100 elements); data may be lost
MTRotator.logevent_target ERROR: evt_target DDS read queue is full (100 elements); data may be lost
MTM2.ilcData ERROR: tel_ilcData DDS read queue is full (100 elements); data may be lost
MTM2.forceBalance ERROR: tel_forceBalance DDS read queue is full (100 elements); data may be lost
MTM1M3.inclinometerData ERROR: tel_inclinometerData DDS read queue is full (100 elements); data may be lost
MTM2.displacementSensors ERROR: tel_displacementSensors DDS read queue is full (100 elements); data may be lost
MTM1M3.imsData ERROR: tel_imsData DDS read queue is full (100 elements); data may be lost
MTM2.axialEncoderPositions ERROR: tel_axialEncoderPositions DDS read queue is full (100 elements); data may be lost
MTM1M3.hardpointMonitorData ERROR: tel_hardpointMonitorData DDS read queue is full (100 elements); data may be lost
MTM1M3.hardpointActuatorData ERROR: tel_hardpointActuatorData DDS read queue is full (100 elements); data may be lost
MTM1M3.forceActuatorData ERROR: tel_forceActuatorData DDS read queue is full (100 elements); data may be lost
MTM1M3.accelerometerData ERROR: tel_accelerometerData DDS read queue is full (100 elements); data may be lost
MTM1M3.logevent_forceActuatorWarning ERROR: evt_forceActuatorWarning DDS read queue is full (100 elements); data may be lost
```

```
MTM1M3.logevent_appliedThermalForces ERROR: evt_appliedThermalForces DDS re  
ad queue is full (100 elements); data may be lost  
MTM1M3.logevent_appliedStaticForces ERROR: evt_appliedStaticForces DDS read  
queue is full (100 elements); data may be lost  
MTM1M3.logevent_appliedForces ERROR: evt_appliedForces DDS read queue is fu  
ll (100 elements); data may be lost
```

```
Current elevation: 83.4 - current aberration z7  
MTM1M3.logevent_appliedElevationForces ERROR: evt_appliedElevationForces DD  
S read queue is full (100 elements); data may be lost  
MTM1M3.logevent_appliedCylinderForces ERROR: evt_appliedCylinderForces DDS  
read queue is full (100 elements); data may be lost  
MTM1M3.logevent_appliedBalanceForces ERROR: evt_appliedBalanceForces DDS re  
ad queue is full (100 elements); data may be lost  
MTM1M3.logevent_appliedAzimuthForces ERROR: evt_appliedAzimuthForces DDS re  
ad queue is full (100 elements); data may be lost  
MTM1M3.logevent_appliedActiveOpticForces ERROR: evt_appliedActiveOpticForce  
s DDS read queue is full (100 elements); data may be lost  
MTM1M3.logevent_appliedAberrationForces ERROR: evt_appliedAberrationForces  
DDS read queue is full (100 elements); data may be lost  
Moving elevation to 84.36 deg  
MTHexapod.electrical WARNING: tel_electrical DDS read queue is filling: 40  
of 100 elements  
MTHexapod.electrical WARNING: tel_electrical DDS read queue is filling: 19  
of 100 elements  
MTM1M3.powerSupplyData ERROR: tel_powerSupplyData DDS read queue is full (1  
00 elements); data may be lost  
MTHexapod.application WARNING: tel_application DDS read queue is filling: 4  
1 of 100 elements  
MTHexapod.application WARNING: tel_application DDS read queue is filling: 2  
0 of 100 elements  
MTM1M3.pidData ERROR: tel_pidData DDS read queue is full (100 elements); da  
ta may be lost  
MTHexapod.actuators WARNING: tel_actuators DDS read queue is filling: 40 of  
100 elements  
MTHexapod.actuators WARNING: tel_actuators DDS read queue is filling: 19 of  
100 elements  
MTM1M3.outerLoopData ERROR: tel_outerLoopData DDS read queue is full (100 e  
lements); data may be lost  
MTM1M3.inclinometerData ERROR: tel_inclinometerData DDS read queue is full  
(100 elements); data may be lost  
MTM1M3.hardpointMonitorData ERROR: tel_hardpointMonitorData DDS read queue  
is full (100 elements); data may be lost  
MTM1M3.hardpointActuatorData ERROR: tel_hardpointActuatorData DDS read queu  
e is full (100 elements); data may be lost  
MTM1M3.forceActuatorData ERROR: tel_forceActuatorData DDS read queue is ful  
l (100 elements); data may be lost  
MTM1M3.accelerometerData ERROR: tel_accelerometerData DDS read queue is ful  
l (100 elements); data may be lost  
MTM1M3.logevent_appliedThermalForces ERROR: evt_appliedThermalForces DDS re  
ad queue is full (100 elements); data may be lost
```

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MTM1M3.logevent_appliedStaticForces ERROR: evt_appliedStaticForces DDS read queue is full (100 elements); data may be lost
MTM1M3.logevent_appliedForces ERROR: evt_appliedForces DDS read queue is full (100 elements); data may be lost
MTM1M3.logevent_appliedElevationForces ERROR: evt_appliedElevationForces DDS read queue is full (100 elements); data may be lost
MTM1M3.logevent_appliedCylinderForces ERROR: evt_appliedCylinderForces DDS read queue is full (100 elements); data may be lost
MTM1M3.logevent_appliedBalanceForces ERROR: evt_appliedBalanceForces DDS read queue is full (100 elements); data may be lost
MTM1M3.logevent_appliedAzimuthForces ERROR: evt_appliedAzimuthForces DDS read queue is full (100 elements); data may be lost
MTM1M3.logevent_appliedActiveOpticForces ERROR: evt_appliedActiveOpticForces DDS read queue is full (100 elements); data may be lost
MTM1M3.logevent_appliedAberrationForces ERROR: evt_appliedAberrationForces DDS read queue is full (100 elements); data may be lost
Moving elevation to 84.04 deg
MTHexapod.electrical WARNING: tel_electrical DDS read queue is filling: 10 of 100 elements
MTHexapod.electrical WARNING: tel_electrical DDS read queue is filling: 20 of 100 elements
MTHexapod.application WARNING: tel_application DDS read queue is filling: 10 of 100 elements
MTHexapod.application WARNING: tel_application DDS read queue is filling: 20 of 100 elements
MTHexapod.actuators WARNING: tel_actuators DDS read queue is filling: 20 of 100 elements
Moving elevation to 83.72 deg
MTHexapod.electrical WARNING: tel_electrical DDS read queue is filling: 10 of 100 elements
MTHexapod.electrical WARNING: tel_electrical DDS read queue is filling: 20 of 100 elements
MTHexapod.application WARNING: tel_application DDS read queue is filling: 10 of 100 elements
MTHexapod.application WARNING: tel_application DDS read queue is filling: 20 of 100 elements
MTHexapod.actuators WARNING: tel_actuators DDS read queue is filling: 19 of 100 elements
Moving elevation to 83.40 deg
MTHexapod.electrical WARNING: tel_electrical DDS read queue is filling: 10 of 100 elements
MTHexapod.electrical WARNING: tel_electrical DDS read queue is filling: 20 of 100 elements
MTHexapod.application WARNING: tel_application DDS read queue is filling: 10 of 100 elements
MTHexapod.application WARNING: tel_application DDS read queue is filling: 20 of 100 elements
MTHexapod.actuators WARNING: tel_actuators DDS read queue is filling: 19 of 100 elements
setup.MTCS DEBUG: Setting rotator to physical fixed position 0.0 deg. Rotator will not track.
MTHexapod.electrical WARNING: tel_electrical DDS read queue is filling: 10 of 100 elements
```

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MTHexapod.electrical WARNING: tel_electrical DDS read queue is filling: 20  
of 100 elements  
MTHexapod.application WARNING: tel_application DDS read queue is filling: 1  
0 of 100 elements  
MTHexapod.application WARNING: tel_application DDS read queue is filling: 2  
1 of 100 elements  
MTHexapod.actuators WARNING: tel_actuators DDS read queue is filling: 20 of  
100 elements  
setup.MTCS DEBUG: Wait 5.0s for rotator to settle down.  
setup.MTCS DEBUG: Workaround for rotator trajectory problem. Moving rotator  
to its current position: -0.10  
setup.MTCS DEBUG: Wait for MTRotator in position event.  
setup.MTCS DEBUG: MTRotator in position: True.  
setup.MTCS DEBUG: MTRotator already in position. Handling potential race co  
ndition.  
setup.MTCS INFO: MTRotator in position: False.  
setup.MTCS INFO: MTRotator in position: True.  
setup.MTCS DEBUG: MTRotator in position True. Waiting settle time 5.0s  
setup.MTCS DEBUG: Sending slew command.  
setup.MTCS DEBUG: Scheduling check coroutines  
setup.MTCS DEBUG: process as completed...  
setup.MTCS DEBUG: Monitor position started.  
setup.MTCS DEBUG: Waiting for Target event from mtmount.  
setup.MTCS DEBUG: mtmount: <State.ENABLED: 2>  
setup.MTCS DEBUG: mpttg: <State.ENABLED: 2>  
setup.MTCS DEBUG: mtaos: <State.ENABLED: 2>  
setup.MTCS DEBUG: mtm1m3: <State.ENABLED: 2>  
setup.MTCS DEBUG: mtm2: <State.ENABLED: 2>  
setup.MTCS DEBUG: mthexapod_1: <State.ENABLED: 2>  
setup.MTCS DEBUG: mthexapod_2: <State.ENABLED: 2>  
setup.MTCS DEBUG: mtrotator: <State.ENABLED: 2>  
setup.MTCS DEBUG: mtdome: <State.ENABLED: 2>  
setup.MTCS DEBUG: mtdometrajectory: <State.ENABLED: 2>  
setup.MTCS DEBUG: Wait for mtmount in position events.  
setup.MTCS DEBUG: Wait for dome in position event.  
setup.MTCS DEBUG: Wait for MTRotator in position event.  
setup.MTCS DEBUG: MTRotator in position: True.  
setup.MTCS DEBUG: MTRotator already in position. Handling potential race co  
ndition.  
setup.MTCS DEBUG: Wait for MTMount elevation in position event.  
setup.MTCS DEBUG: MTMount elevation in position: True.  
setup.MTCS DEBUG: MTMount elevation already in position. Handling potential  
race condition.  
setup.MTCS DEBUG: Wait for MTMount azimuth in position event.  
setup.MTCS DEBUG: MTMount azimuth in position: True.  
setup.MTCS DEBUG: MTMount azimuth already in position. Handling potential r  
ace condition.
```

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setup.MTCS DEBUG: Mount target: private_revCode: bdcb00ba, private_sndStamp: 1655776516.7765, private_rcvStamp: 1655776516.7771337, private_seqNum: 36295, private_identity: MTMount, private_origin: 44621, elevation: 83.39097859384154, elevationVelocity: -0.0006852203498646718, azimuth: 190.94536217111448, azimuthVelocity: 0.028473977039746787, taiTime: 1655776516.8355439, trackId: 3, tracksys: SIDEREAL, radesys: ICRS, priority: 0
setup.MTCS INFO: MTMount elevation in position: False.
setup.MTCS INFO: MTMount azimuth in position: False.
setup.MTCS INFO: MTMount elevation in position: True.
setup.MTCS DEBUG: MTMount elevation in position True. Waiting settle time 3.0s
setup.MTCS INFO: MTRotator in position: False.
setup.MTCS INFO: MTMount azimuth in position: True.
setup.MTCS DEBUG: MTMount azimuth in position True. Waiting settle time 3.0s
setup.MTCS INFO: MTRotator in position: True.
setup.MTCS DEBUG: MTRotator in position True. Waiting settle time 3.0s
setup.MTCS DEBUG: [Tel]: Az = +190.502[ +0.4]; El = +083.399[ -0.0] [Rot]: -000.100[ +0.0] [Dome] Az = +000.000; El = +000.000
setup.MTCS DEBUG: Dome azimuth in position.
setup.MTCS DEBUG: Dome elevation in position.
setup.MTCS DEBUG: Stop tracking.
MTPtg.timeAndDate ERROR: tel_timeAndDate DDS read queue is full (100 elements); data may be lost
MTHexapod.electrical ERROR: tel_electrical DDS read queue is full (100 elements); data may be lost
MTM1M3.powerSupplyData ERROR: tel_powerSupplyData DDS read queue is full (100 elements); data may be lost
MTHexapod.electrical ERROR: tel_electrical DDS read queue is full (100 elements); data may be lost
MTRotator.rotation ERROR: tel_rotation DDS read queue is full (100 elements); data may be lost
MTMount.elevation ERROR: tel_elevation DDS read queue is full (100 elements); data may be lost
MTHexapod.application ERROR: tel_application DDS read queue is full (100 elements); data may be lost
MTMount.cameraCableWrap ERROR: tel_cameraCableWrap DDS read queue is full (100 elements); data may be lost
MTRotator.motors ERROR: tel_motors DDS read queue is full (100 elements); data may be lost
MTHexapod.application ERROR: tel_application DDS read queue is full (100 elements); data may be lost
MTM2.tangentEncoderPositions ERROR: tel_tangentEncoderPositions DDS read queue is full (100 elements); data may be lost
MTPtg.mountStatus ERROR: tel_mountStatus DDS read queue is full (100 elements); data may be lost
MTDome.azimuth ERROR: tel_azimuth DDS read queue is full (100 elements); data may be lost
MTHexapod.actuators ERROR: tel_actuators DDS read queue is full (100 elements); data may be lost
MTPtg.mountPosition ERROR: tel_mountPosition DDS read queue is full (100 elements); data may be lost
```

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MTM1M3.pidData ERROR: tel_pidData DDS read queue is full (100 elements); data may be lost
MTHexapod.logevent_heartbeat WARNING: evt_heartbeat DDS read queue is filling: 39 of 100 elements
MTHexapod.actuators ERROR: tel_actuators DDS read queue is full (100 elements); data may be lost
MTMount.azimuth ERROR: tel_azimuth DDS read queue is full (100 elements); data may be lost
MT2.powerStatus ERROR: tel_powerStatus DDS read queue is full (100 elements); data may be lost
MTDome.logevent_azMotion ERROR: evt_azMotion DDS read queue is full (100 elements); data may be lost
MTPtg.currentTargetStatus ERROR: tel_currentTargetStatus DDS read queue is full (100 elements); data may be lost
MTHexapod.logevent_heartbeat WARNING: evt_heartbeat DDS read queue is filling: 39 of 100 elements
MTMount.logevent_target ERROR: evt_target DDS read queue is full (100 elements); data may be lost
MTM2.positionIMS ERROR: tel_positionIMS DDS read queue is full (100 elements); data may be lost
MTRotator.electrical ERROR: tel_electrical DDS read queue is full (100 elements); data may be lost
MTM2.position ERROR: tel_position DDS read queue is full (100 elements); data may be lost
MTRotator.ccwFollowingError ERROR: tel_ccwFollowingError DDS read queue is full (100 elements); data may be lost
MTM2.netMomentsTotal ERROR: tel_netMomentsTotal DDS read queue is full (100 elements); data may be lost
MTRotator.logevent_target ERROR: evt_target DDS read queue is full (100 elements); data may be lost
MTMount.logevent_cameraCableWrapTarget ERROR: evt_cameraCableWrapTarget DDS read queue is full (100 elements); data may be lost
MTM1M3.outerLoopData ERROR: tel_outerLoopData DDS read queue is full (100 elements); data may be lost
MTM2.netForcesTotal ERROR: tel_netForcesTotal DDS read queue is full (100 elements); data may be lost
MTM2.ilcData ERROR: tel_ilcData DDS read queue is full (100 elements); data may be lost
MTM1M3.inclinometerData ERROR: tel_inclinometerData DDS read queue is full (100 elements); data may be lost
MTM2.forceBalance ERROR: tel_forceBalance DDS read queue is full (100 elements); data may be lost
MTM2.displacementSensors ERROR: tel_displacementSensors DDS read queue is full (100 elements); data may be lost
MTM1M3.imsData ERROR: tel_imsData DDS read queue is full (100 elements); data may be lost
MTM2.axialEncoderPositions ERROR: tel_axialEncoderPositions DDS read queue is full (100 elements); data may be lost
MTM1M3.hardpointMonitorData ERROR: tel_hardpointMonitorData DDS read queue is full (100 elements); data may be lost
MTM1M3.hardpointActuatorData ERROR: tel_hardpointActuatorData DDS read queue is full (100 elements); data may be lost
```

```
MTM1M3.forceActuatorData ERROR: tel_forceActuatorData DDS read queue is full (100 elements); data may be lost
MTM1M3.accelerometerData ERROR: tel_accelerometerData DDS read queue is full (100 elements); data may be lost
MTM1M3.logevent_forceActuatorWarning ERROR: evt_forceActuatorWarning DDS read queue is full (100 elements); data may be lost
MTM1M3.logevent_appliedThermalForces ERROR: evt_appliedThermalForces DDS read queue is full (100 elements); data may be lost
MTM1M3.logevent_appliedStaticForces ERROR: evt_appliedStaticForces DDS read queue is full (100 elements); data may be lost
MTM1M3.logevent_appliedForces ERROR: evt_appliedForces DDS read queue is full (100 elements); data may be lost
```

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Current elevation: 82.4 - current aberration z9
MTM1M3.logevent_appliedElevationForces ERROR: evt_appliedElevationForces DDS read queue is full (100 elements); data may be lost
MTM1M3.logevent_appliedCylinderForces ERROR: evt_appliedCylinderForces DDS read queue is full (100 elements); data may be lost
MTM1M3.logevent_appliedBalanceForces ERROR: evt_appliedBalanceForces DDS read queue is full (100 elements); data may be lost
MTM1M3.logevent_appliedAzimuthForces ERROR: evt_appliedAzimuthForces DDS read queue is full (100 elements); data may be lost
MTM1M3.logevent_appliedActiveOpticForces ERROR: evt_appliedActiveOpticForces DDS read queue is full (100 elements); data may be lost
MTM1M3.logevent_appliedAberrationForces ERROR: evt_appliedAberrationForces DDS read queue is full (100 elements); data may be lost
Moving elevation to 83.36 deg
MTHexapod.electrical WARNING: tel_electrical DDS read queue is filling: 20 of 100 elements
MTM1M3.powerSupplyData ERROR: tel_powerSupplyData DDS read queue is full (100 elements); data may be lost
MTHexapod.electrical WARNING: tel_electrical DDS read queue is filling: 40 of 100 elements
MTHexapod.application WARNING: tel_application DDS read queue is filling: 20 of 100 elements
MTHexapod.application WARNING: tel_application DDS read queue is filling: 40 of 100 elements
MTHexapod.actuators WARNING: tel_actuators DDS read queue is filling: 19 of 100 elements
MTM1M3.pidData ERROR: tel_pidData DDS read queue is full (100 elements); data may be lost
MTHexapod.actuators WARNING: tel_actuators DDS read queue is filling: 39 of 100 elements
MTM1M3.outerLoopData ERROR: tel_outerLoopData DDS read queue is full (100 elements); data may be lost
MTM1M3.inclinometerData ERROR: tel_inclinometerData DDS read queue is full (100 elements); data may be lost
MTM1M3.hardpointMonitorData ERROR: tel_hardpointMonitorData DDS read queue is full (100 elements); data may be lost
MTM1M3.hardpointActuatorData ERROR: tel_hardpointActuatorData DDS read queue is full (100 elements); data may be lost
```

```
MTM1M3.forceActuatorData ERROR: tel_forceActuatorData DDS read queue is full (100 elements); data may be lost
MTM1M3.accelerometerData ERROR: tel_accelerometerData DDS read queue is full (100 elements); data may be lost
MTM1M3.logevent_appliedThermalForces ERROR: evt_appliedThermalForces DDS read queue is full (100 elements); data may be lost
MTM1M3.logevent_appliedStaticForces ERROR: evt_appliedStaticForces DDS read queue is full (100 elements); data may be lost
MTM1M3.logevent_appliedForces ERROR: evt_appliedForces DDS read queue is full (100 elements); data may be lost
MTM1M3.logevent_appliedElevationForces ERROR: evt_appliedElevationForces DDS read queue is full (100 elements); data may be lost
MTM1M3.logevent_appliedCylinderForces ERROR: evt_appliedCylinderForces DDS read queue is full (100 elements); data may be lost
MTM1M3.logevent_appliedBalanceForces ERROR: evt_appliedBalanceForces DDS read queue is full (100 elements); data may be lost
MTM1M3.logevent_appliedAzimuthForces ERROR: evt_appliedAzimuthForces DDS read queue is full (100 elements); data may be lost
MTM1M3.logevent_appliedActiveOpticForces ERROR: evt_appliedActiveOpticForces DDS read queue is full (100 elements); data may be lost
MTM1M3.logevent_appliedAberrationForces ERROR: evt_appliedAberrationForces DDS read queue is full (100 elements); data may be lost
Moving elevation to 83.04 deg
MTHexapod.electrical WARNING: tel_electrical DDS read queue is filling: 20 of 100 elements
MTHexapod.electrical WARNING: tel_electrical DDS read queue is filling: 10 of 100 elements
MTHexapod.application WARNING: tel_application DDS read queue is filling: 20 of 100 elements
MTHexapod.application WARNING: tel_application DDS read queue is filling: 10 of 100 elements
MTHexapod.actuators WARNING: tel_actuators DDS read queue is filling: 20 of 100 elements
Moving elevation to 82.72 deg
MTHexapod.electrical WARNING: tel_electrical DDS read queue is filling: 20 of 100 elements
MTHexapod.application WARNING: tel_application DDS read queue is filling: 20 of 100 elements
MTHexapod.actuators WARNING: tel_actuators DDS read queue is filling: 20 of 100 elements
MTHexapod.application WARNING: tel_application DDS read queue is filling: 10 of 100 elements
Moving elevation to 82.40 deg
MTHexapod.electrical WARNING: tel_electrical DDS read queue is filling: 10 of 100 elements
MTHexapod.electrical WARNING: tel_electrical DDS read queue is filling: 20 of 100 elements
MTHexapod.application WARNING: tel_application DDS read queue is filling: 10 of 100 elements
MTHexapod.application WARNING: tel_application DDS read queue is filling: 20 of 100 elements
MTHexapod.actuators WARNING: tel_actuators DDS read queue is filling: 19 of 100 elements
```

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setup.MTCS DEBUG: Setting rotator to physical fixed position 0.0 deg. Rotator will not track.
MTHexapod.electrical WARNING: tel_electrical DDS read queue is filling: 10 of 100 elements
MTHexapod.electrical WARNING: tel_electrical DDS read queue is filling: 20 of 100 elements
MTHexapod.application WARNING: tel_application DDS read queue is filling: 12 of 100 elements
MTHexapod.actuators WARNING: tel_actuators DDS read queue is filling: 11 of 100 elements
MTHexapod.application WARNING: tel_application DDS read queue is filling: 24 of 100 elements
MTHexapod.actuators WARNING: tel_actuators DDS read queue is filling: 23 of 100 elements
setup.MTCS DEBUG: Wait 5.0s for rotator to settle down.
setup.MTCS DEBUG: Workaround for rotator trajectory problem. Moving rotator to its current position: 0.10
setup.MTCS DEBUG: Wait for MTRotator in position event.
setup.MTCS DEBUG: MTRotator in position: True.
setup.MTCS DEBUG: MTRotator already in position. Handling potential race condition.
setup.MTCS INFO: MTRotator in position: False.
setup.MTCS INFO: MTRotator in position: True.
setup.MTCS DEBUG: MTRotator in position True. Waiting settle time 5.0s
setup.MTCS DEBUG: Sending slew command.
setup.MTCS DEBUG: Scheduling check coroutines
setup.MTCS DEBUG: process as completed...
setup.MTCS DEBUG: Monitor position started.
setup.MTCS DEBUG: Waiting for Target event from mtmount.
setup.MTCS DEBUG: mtmount: <State.ENABLED: 2>
setup.MTCS DEBUG: mtptg: <State.ENABLED: 2>
setup.MTCS DEBUG: mtaos: <State.ENABLED: 2>
setup.MTCS DEBUG: mtm1m3: <State.ENABLED: 2>
setup.MTCS DEBUG: mtm2: <State.ENABLED: 2>
setup.MTCS DEBUG: mthexapod_1: <State.ENABLED: 2>
setup.MTCS DEBUG: mthexapod_2: <State.ENABLED: 2>
setup.MTCS DEBUG: mtrotator: <State.ENABLED: 2>
setup.MTCS DEBUG: mtdome: <State.ENABLED: 2>
setup.MTCS DEBUG: mtdometrajectory: <State.ENABLED: 2>
setup.MTCS DEBUG: Wait for mtmount in position events.
setup.MTCS DEBUG: Wait for dome in position event.
setup.MTCS DEBUG: Wait for MTRotator in position event.
setup.MTCS DEBUG: MTRotator in position: True.
setup.MTCS DEBUG: MTRotator already in position. Handling potential race condition.
setup.MTCS DEBUG: Wait for MTMount elevation in position event.
setup.MTCS DEBUG: MTMount elevation in position: True.
setup.MTCS DEBUG: MTMount elevation already in position. Handling potential race condition.
setup.MTCS DEBUG: Wait for MTMount azimuth in position event.
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setup.MTCS DEBUG: MTMount azimuth in position: True.
setup.MTCS DEBUG: MTMount azimuth already in position. Handling potential race condition.
setup.MTCS DEBUG: Mount target: private_revCode: bdcb00ba, private_sndStamp: 1655776586.5633562, private_rcvStamp: 1655776586.5637472, private_seqNum: 37148, private_identity: MTMount, private_origin: 44621, elevation: 82.39066141379897, elevationVelocity: -0.0006825384348693986, azimuth: 190.9021043018769, azimuthVelocity: 0.024419412831196093, taiTime: 1655776586.6223977, trackId: 4, tracksys: SIDEREAL, radesys: ICRS, priority: 0
setup.MTCS INFO: MTMount elevation in position: False.
setup.MTCS INFO: MTMount azimuth in position: False.
setup.MTCS INFO: MTMount elevation in position: True.
setup.MTCS DEBUG: MTMount elevation in position True. Waiting settle time 3.0s
setup.MTCS INFO: MTRotator in position: False.
setup.MTCS INFO: MTMount azimuth in position: True.
setup.MTCS DEBUG: MTMount azimuth in position True. Waiting settle time 3.0s
setup.MTCS INFO: MTRotator in position: True.
setup.MTCS DEBUG: MTRotator in position True. Waiting settle time 3.0s
setup.MTCS DEBUG: [Tel]: Az = +190.511[ +0.4]; El = +082.394[ -0.0] [Rot]: +000.100[ +0.0] [Dome] Az = +000.000; El = +000.000
setup.MTCS DEBUG: Dome azimuth in position.
setup.MTCS DEBUG: Dome elevation in position.
setup.MTCS DEBUG: Stop tracking.
MTM1M3.powerSupplyData ERROR: tel_powerSupplyData DDS read queue is full (100 elements); data may be lost
MTPtg.timeAndDate ERROR: tel_timeAndDate DDS read queue is full (100 elements); data may be lost
MTRotator.rotation ERROR: tel_rotation DDS read queue is full (100 elements); data may be lost
MTMount.elevation ERROR: tel_elevation DDS read queue is full (100 elements); data may be lost
MTHexapod.electrical ERROR: tel_electrical DDS read queue is full (100 elements); data may be lost
MTHexapod.electrical ERROR: tel_electrical DDS read queue is full (100 elements); data may be lost
MTHexapod.application ERROR: tel_application DDS read queue is full (100 elements); data may be lost
MTRotator.motors ERROR: tel_motors DDS read queue is full (100 elements); data may be lost
MTM1M3.pidData ERROR: tel_pidData DDS read queue is full (100 elements); data may be lost
MTM2.tangentEncoderPositions ERROR: tel_tangentEncoderPositions DDS read queue is full (100 elements); data may be lost
MTRotator.electrical ERROR: tel_electrical DDS read queue is full (100 elements); data may be lost
MTMount.cameraCableWrap ERROR: tel_cameraCableWrap DDS read queue is full (100 elements); data may be lost
MTDome.azimuth ERROR: tel_azimuth DDS read queue is full (100 elements); data may be lost
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MTPtg.mountStatus ERROR: tel_mountStatus DDS read queue is full (100 elements); data may be lost
MTHexapod.application ERROR: tel_application DDS read queue is full (100 elements); data may be lost
MTHexapod.actuators ERROR: tel_actuators DDS read queue is full (100 elements); data may be lost
MTM2.powerStatus ERROR: tel_powerStatus DDS read queue is full (100 elements); data may be lost
MTPtg.mountPosition ERROR: tel_mountPosition DDS read queue is full (100 elements); data may be lost
MTHexapod.logevent_heartbeat WARNING: evt_heartbeat DDS read queue is filling: 39 of 100 elements
MTMount.azimuth ERROR: tel_azimuth DDS read queue is full (100 elements); data may be lost
MTM2.positionIMS ERROR: tel_positionIMS DDS read queue is full (100 elements); data may be lost
MTDome.logevent_azMotion ERROR: evt_azMotion DDS read queue is full (100 elements); data may be lost
MTMount.logevent_target ERROR: evt_target DDS read queue is full (100 elements); data may be lost
MTRotator.ccwFollowingError ERROR: tel_ccwFollowingError DDS read queue is full (100 elements); data may be lost
MTM2.position ERROR: tel_position DDS read queue is full (100 elements); data may be lost
MTHexapod.actuators ERROR: tel_actuators DDS read queue is full (100 elements); data may be lost
MTPtg.currentTargetStatus ERROR: tel_currentTargetStatus DDS read queue is full (100 elements); data may be lost
MTHexapod.logevent_heartbeat WARNING: evt_heartbeat DDS read queue is filling: 39 of 100 elements
MTMount.logevent_cameraCableWrapTarget ERROR: evt_cameraCableWrapTarget DDS read queue is full (100 elements); data may be lost
MTM2.netMomentsTotal ERROR: tel_netMomentsTotal DDS read queue is full (100 elements); data may be lost
MTM1M3.outerLoopData ERROR: tel_outerLoopData DDS read queue is full (100 elements); data may be lost
MTM2.netForcesTotal ERROR: tel_netForcesTotal DDS read queue is full (100 elements); data may be lost
MTRotator.logevent_target ERROR: evt_target DDS read queue is full (100 elements); data may be lost
MTM2.ilcData ERROR: tel_ilcData DDS read queue is full (100 elements); data may be lost
MTM2.forceBalance ERROR: tel_forceBalance DDS read queue is full (100 elements); data may be lost
MTM1M3.inclinometerData ERROR: tel_inclinometerData DDS read queue is full (100 elements); data may be lost
MTM2.displacementSensors ERROR: tel_displacementSensors DDS read queue is full (100 elements); data may be lost
MTM1M3.imsData ERROR: tel_imsData DDS read queue is full (100 elements); data may be lost
MTM2.axialEncoderPositions ERROR: tel_axialEncoderPositions DDS read queue is full (100 elements); data may be lost
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MTM1M3.hardpointMonitorData ERROR: tel_hardpointMonitorData DDS read queue
is full (100 elements); data may be lost
MTM1M3.hardpointActuatorData ERROR: tel_hardpointActuatorData DDS read queue
is full (100 elements); data may be lost
MTM1M3.forceActuatorData ERROR: tel_forceActuatorData DDS read queue is ful
l (100 elements); data may be lost
MTM1M3.accelerometerData ERROR: tel_accelerometerData DDS read queue is ful
l (100 elements); data may be lost
MTM1M3.logevent_forceActuatorWarning ERROR: evt_forceActuatorWarning DDS re
ad queue is full (100 elements); data may be lost
MTM1M3.logevent_appliedThermalForces ERROR: evt_appliedThermalForces DDS re
ad queue is full (100 elements); data may be lost
MTM1M3.logevent_appliedStaticForces ERROR: evt_appliedStaticForces DDS read
queue is full (100 elements); data may be lost
Gathering data - with Aberrations (reset every time) - End time: 2022-06-21T0
1:56:32.971

```

In [26]: `print(t_start_with_aberration, t_end_with_aberration)`

```
2022-06-21T01:51:30.700 2022-06-21T01:56:32.971
```

## Plot Optics vs Time

Plot the following as a function of time during the above process:

- mount elevation
- m1m3 actuator 101 z force
- m2 actuator B1 force
- camera hex y position
- m2 hex y position

In [27]: `# Query telemetry`  
`df_aberr = await get_data_from_efd(`  
 `exec_info.loc,`  
 `t_start_with_aberration,`  
 `t_end_with_aberration)`

```

MTHexapod.electrical WARNING: tel_electrical DDS read queue is filling: 33
of 100 elements
MTHexapod.electrical WARNING: tel_electrical DDS read queue is filling: 16
of 100 elements
MTHexapod.application WARNING: tel_application DDS read queue is filling: 3
4 of 100 elements
MTHexapod.application WARNING: tel_application DDS read queue is filling: 1
6 of 100 elements
MTHexapod.actuators WARNING: tel_actuators DDS read queue is filling: 33 of
100 elements
MTHexapod.actuators WARNING: tel_actuators DDS read queue is filling: 15 of
100 elements

```

In [32]: `fig, axs = plt.subplots(figsize=(10, 10), nrows=4, sharex=True)`  
`axs[0].plot(df_aberr["mount_el"].dropna(), "k", label="Mount Elevation")`  
`axs[0].set_ylabel("Mount El\n[deg]")`

```
axs[1].plot(df_aberr[ "m1m3_z101" ].dropna(), "C0o-", label="z")
axs[1].set_ylabel("M1M3 Forces\n[--]")

# axs[2].plot(df_aberr[ "m2b1_applied" ].dropna(), "C1^-", label="applied")
# axs[2].plot(df_aberr[ "m2b1_gravLut" ].dropna(), "C2v-", label="Gravity LUT")
axs[2].plot(df_aberr[ "m2b1_measured" ].dropna(), "C3-", label="Measured")
axs[2].set_ylabel("M2 Forces\n[--]")

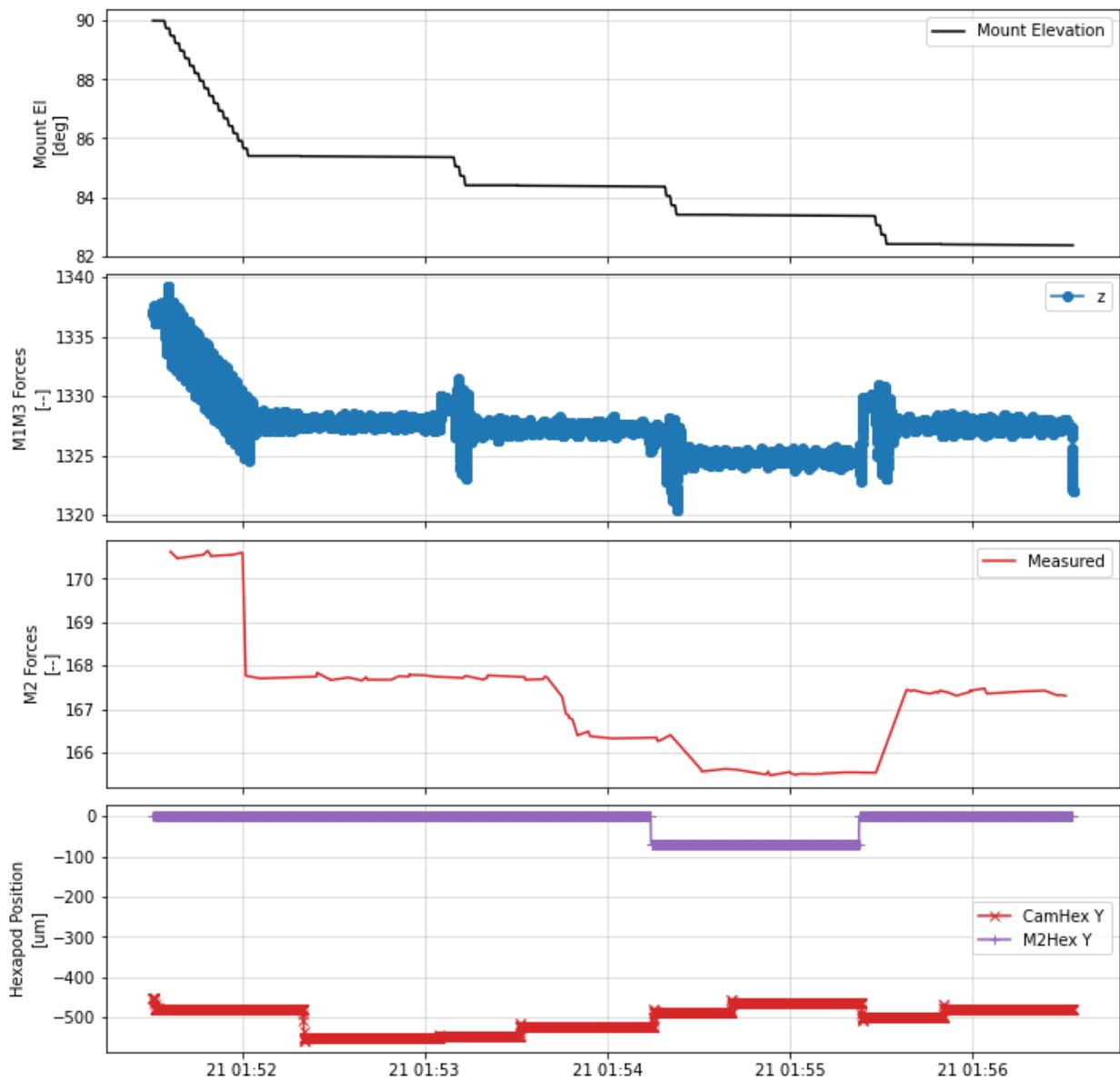
axs[3].plot(df_aberr[ "camhex_y" ].dropna(), "C3x-", label="CamHex Y")
axs[3].plot(df_aberr[ "m2hex_y" ].dropna(), "C4+-", label="M2Hex Y")
axs[3].set_ylabel("Hexapod Position\n[n[um]]")

for ax in axs:
    ax.grid(":", alpha=0.5)
    ax.legend()

fig.suptitle(f"{test_execution} - M1M3/M2/Hexs/Elevation with Aberrations vs Ti
fig.tight_layout(h_pad=0.3)
fig.patch.set_facecolor('white')

fig.savefig(f"plots/{test_execution}_m1m3_m2_hexs_el_vs_time_with_aberr.png")
plt.show()
```

## LVV-D220620 - M1M3/M2/Hexs/Elevation with Aberrations vs Time



```

MTHexapod.electrical WARNING: tel_electrical DDS read queue is filling: 16
of 100 elements
MTHexapod.application WARNING: tel_application DDS read queue is filling: 1
6 of 100 elements
MTHexapod.actuators WARNING: tel_actuators DDS read queue is filling: 15 of
100 elements

```

## Gather Data - With Accumulated Aberrations

```

In [30]: # We start at 85.4 deg because the track fails at 85.5 deg
target_elevations = [85.4, 84.4, 83.4, 82.4]
aberrations = [
    0, # z4 (focus)
    1, # z5 (astigmatism)
    3, # z7 (y-coma)
    5, # z9 (trefoil)
]
await mtcs.rem.mtaos.cmd_resetCorrection.start()

```

```

await mtcs.rem.mtaos.cmd_issueCorrection.start(timeout=60.)

t_start_with_acc_aberration = Time.now()
t_start_with_acc_aberration.format = "isot"
print(f"Gathering data - with Aberrations Accumulated - Start time: {t_start_with

for _el, _ab in zip(target_elevations, aberrations):

    print(f"\n\n\nCurrent elevation: {_el} - current aberration z{_ab + 4}")

    # the input for addAberration is an array with 19 elements representing
    # the zernike coefficients starting at z4
    waveform_errors = np.zeros(19)
    waveform_errors[_ab] = 1.0 # um
    await mtcs.rem.mtaos.cmd_addAberration.set_start(wf=waveform_errors, timeout=60.)
    await mtcs.rem.mtaos.cmd_issueCorrection.start(timeout=60.)
    time.sleep(2.)

    az, el = await moveMountInElevationSteps(_el, azimuth=190.5)

    target = mtcs.radec_fromazel(az=az, el=el)
    await mtcs.slew_icrs(ra=target.ra, dec=target.dec, rot_type=RotType.Physical)

    # 39. seconds is the exposure time (2 * 15 sec) plus readout
    time.sleep(39.)
    await mtcs.stop_tracking()

t_end_with_acc_aberration = Time.now()
t_end_with_acc_aberration.format = "isot"
print(f"Gathering data - with Aberrations Accumulated - End time: {t_start_with

```

Gathering data - with Aberrations Accumulated - Start time: 2022-06-21T01:57:3  
6.178

Current elevation: 85.4 - current aberration z4  
Moving elevation to 82.36 deg

MTHexapod.electrical **WARNING**: tel\_electrical DDS read queue is filling: 40 of 100 elements

MTM1M3.powerSupplyData **ERROR**: tel\_powerSupplyData DDS read queue is full (100 elements); data may be lost

MTHexapod.electrical **WARNING**: tel\_electrical DDS read queue is filling: 20 of 100 elements

MTHexapod.application **WARNING**: tel\_application DDS read queue is filling: 40 of 100 elements

MTHexapod.application **WARNING**: tel\_application DDS read queue is filling: 20 of 100 elements

MTHexapod.actuators **WARNING**: tel\_actuators DDS read queue is filling: 39 of 100 elements

MTM1M3.pidData **ERROR**: tel\_pidData DDS read queue is full (100 elements); data may be lost

MTHexapod.actuators **WARNING**: tel\_actuators DDS read queue is filling: 19 of 100 elements

MTM1M3.outerLoopData **ERROR**: tel\_outerLoopData DDS read queue is full (100 elements); data may be lost

```
MTM1M3.inclinometerData ERROR: tel_inclinometerData DDS read queue is full  
    (100 elements); data may be lost  
MTM1M3.hardpointMonitorData ERROR: tel_hardpointMonitorData DDS read queue  
    is full (100 elements); data may be lost  
MTM1M3.hardpointActuatorData ERROR: tel_hardpointActuatorData DDS read queu  
e is full (100 elements); data may be lost  
MTM1M3.forceActuatorData ERROR: tel_forceActuatorData DDS read queue is ful  
l (100 elements); data may be lost  
MTM1M3.accelerometerData ERROR: tel_accelerometerData DDS read queue is ful  
l (100 elements); data may be lost  
MTM1M3.logevent_appliedThermalForces ERROR: evt_appliedThermalForces DDS re  
ad queue is full (100 elements); data may be lost  
MTM1M3.logevent_appliedStaticForces ERROR: evt_appliedStaticForces DDS read  
queue is full (100 elements); data may be lost  
MTM1M3.logevent_appliedForces ERROR: evt_appliedForces DDS read queue is fu  
ll (100 elements); data may be lost  
MTM1M3.logevent_appliedElevationForces ERROR: evt_appliedElevationForces DD  
S read queue is full (100 elements); data may be lost  
MTM1M3.logevent_appliedCylinderForces ERROR: evt_appliedCylinderForces DDS  
read queue is full (100 elements); data may be lost  
MTM1M3.logevent_appliedBalanceForces ERROR: evt_appliedBalanceForces DDS re  
ad queue is full (100 elements); data may be lost  
MTM1M3.logevent_appliedAzimuthForces ERROR: evt_appliedAzimuthForces DDS re  
ad queue is full (100 elements); data may be lost  
MTM1M3.logevent_appliedActiveOpticForces ERROR: evt_appliedActiveOpticForce  
s DDS read queue is full (100 elements); data may be lost  
MTM1M3.logevent_appliedAberrationForces ERROR: evt_appliedAberrationForces  
DDS read queue is full (100 elements); data may be lost  
Moving elevation to 82.61 deg  
MTHexapod.electrical WARNING: tel_electrical DDS read queue is filling: 10  
    of 100 elements  
MTHexapod.electrical WARNING: tel_electrical DDS read queue is filling: 20  
    of 100 elements  
MTHexapod.application WARNING: tel_application DDS read queue is filling: 1  
    of 100 elements  
MTHexapod.application WARNING: tel_application DDS read queue is filling: 2  
    of 100 elements  
MTHexapod.actuators WARNING: tel_actuators DDS read queue is filling: 19 of  
    100 elements  
Moving elevation to 82.87 deg  
MTHexapod.electrical WARNING: tel_electrical DDS read queue is filling: 20  
    of 100 elements  
MTHexapod.electrical WARNING: tel_electrical DDS read queue is filling: 10  
    of 100 elements  
MTHexapod.application WARNING: tel_application DDS read queue is filling: 2  
    of 100 elements  
MTHexapod.application WARNING: tel_application DDS read queue is filling: 1  
    of 100 elements  
MTHexapod.actuators WARNING: tel_actuators DDS read queue is filling: 19 of  
    100 elements  
Moving elevation to 83.12 deg  
MTHexapod.electrical WARNING: tel_electrical DDS read queue is filling: 20  
    of 100 elements
```

```
MTHexapod.electrical WARNING: tel_electrical DDS read queue is filling: 10  
of 100 elements  
MTHexapod.application WARNING: tel_application DDS read queue is filling: 2  
0 of 100 elements  
MTHexapod.application WARNING: tel_application DDS read queue is filling: 1  
0 of 100 elements  
MTHexapod.actuators WARNING: tel_actuators DDS read queue is filling: 19 of  
100 elements  
Moving elevation to 83.37 deg  
MTHexapod.electrical WARNING: tel_electrical DDS read queue is filling: 20  
of 100 elements  
MTHexapod.application WARNING: tel_application DDS read queue is filling: 1  
0 of 100 elements  
MTHexapod.application WARNING: tel_application DDS read queue is filling: 2  
1 of 100 elements  
MTHexapod.actuators WARNING: tel_actuators DDS read queue is filling: 20 of  
100 elements  
Moving elevation to 83.63 deg  
MTHexapod.electrical WARNING: tel_electrical DDS read queue is filling: 20  
of 100 elements  
MTHexapod.electrical WARNING: tel_electrical DDS read queue is filling: 10  
of 100 elements  
MTHexapod.application WARNING: tel_application DDS read queue is filling: 2  
0 of 100 elements  
MTHexapod.application WARNING: tel_application DDS read queue is filling: 1  
0 of 100 elements  
MTHexapod.actuators WARNING: tel_actuators DDS read queue is filling: 20 of  
100 elements  
MTHexapod.actuators WARNING: tel_actuators DDS read queue is filling: 10 of  
100 elements  
Moving elevation to 83.88 deg  
MTHexapod.electrical WARNING: tel_electrical DDS read queue is filling: 20  
of 100 elements  
MTHexapod.electrical WARNING: tel_electrical DDS read queue is filling: 10  
of 100 elements  
MTHexapod.application WARNING: tel_application DDS read queue is filling: 2  
1 of 100 elements  
MTHexapod.application WARNING: tel_application DDS read queue is filling: 1  
0 of 100 elements  
MTHexapod.actuators WARNING: tel_actuators DDS read queue is filling: 20 of  
100 elements  
Moving elevation to 84.13 deg  
MTHexapod.electrical WARNING: tel_electrical DDS read queue is filling: 20  
of 100 elements  
MTHexapod.electrical WARNING: tel_electrical DDS read queue is filling: 10  
of 100 elements  
MTHexapod.application WARNING: tel_application DDS read queue is filling: 2  
0 of 100 elements  
MTHexapod.application WARNING: tel_application DDS read queue is filling: 1  
0 of 100 elements  
MTHexapod.actuators WARNING: tel_actuators DDS read queue is filling: 19 of  
100 elements  
Moving elevation to 84.39 deg
```

```
MTHexapod.electrical WARNING: tel_electrical DDS read queue is filling: 10  
of 100 elements  
MTHexapod.electrical WARNING: tel_electrical DDS read queue is filling: 20  
of 100 elements  
MTHexapod.application WARNING: tel_application DDS read queue is filling: 1  
0 of 100 elements  
MTHexapod.application WARNING: tel_application DDS read queue is filling: 2  
0 of 100 elements  
MTHexapod.actuators WARNING: tel_actuators DDS read queue is filling: 19 of  
100 elements  
MTHexapod.actuators WARNING: tel_actuators DDS read queue is filling: 10 of  
100 elements  
Moving elevation to 84.64 deg  
MTHexapod.electrical WARNING: tel_electrical DDS read queue is filling: 21  
of 100 elements  
MTHexapod.electrical WARNING: tel_electrical DDS read queue is filling: 10  
of 100 elements  
MTHexapod.application WARNING: tel_application DDS read queue is filling: 2  
1 of 100 elements  
MTHexapod.application WARNING: tel_application DDS read queue is filling: 1  
0 of 100 elements  
MTHexapod.actuators WARNING: tel_actuators DDS read queue is filling: 20 of  
100 elements  
MTHexapod.actuators WARNING: tel_actuators DDS read queue is filling: 10 of  
100 elements  
Moving elevation to 84.89 deg  
MTHexapod.electrical WARNING: tel_electrical DDS read queue is filling: 20  
of 100 elements  
MTHexapod.electrical WARNING: tel_electrical DDS read queue is filling: 10  
of 100 elements  
MTHexapod.application WARNING: tel_application DDS read queue is filling: 2  
1 of 100 elements  
MTHexapod.application WARNING: tel_application DDS read queue is filling: 1  
0 of 100 elements  
MTHexapod.actuators WARNING: tel_actuators DDS read queue is filling: 20 of  
100 elements  
Moving elevation to 85.15 deg  
MTHexapod.electrical WARNING: tel_electrical DDS read queue is filling: 20  
of 100 elements  
MTHexapod.electrical WARNING: tel_electrical DDS read queue is filling: 10  
of 100 elements  
MTHexapod.application WARNING: tel_application DDS read queue is filling: 2  
0 of 100 elements  
MTHexapod.application WARNING: tel_application DDS read queue is filling: 1  
0 of 100 elements  
MTHexapod.actuators WARNING: tel_actuators DDS read queue is filling: 20 of  
100 elements  
Moving elevation to 85.40 deg  
MTHexapod.electrical WARNING: tel_electrical DDS read queue is filling: 20  
of 100 elements  
MTHexapod.electrical WARNING: tel_electrical DDS read queue is filling: 10  
of 100 elements
```

```
MTHexapod.application WARNING: tel_application DDS read queue is filling: 2
0 of 100 elements
MTHexapod.application WARNING: tel_application DDS read queue is filling: 1
0 of 100 elements
MTHexapod.actuators WARNING: tel_actuators DDS read queue is filling: 20 of
100 elements
MTHexapod.actuators WARNING: tel_actuators DDS read queue is filling: 10 of
100 elements
setup.MTCS DEBUG: Setting rotator to physical fixed position 0.0 deg. Rotat
or will not track.
MTHexapod.electrical WARNING: tel_electrical DDS read queue is filling: 10
of 100 elements
MTHexapod.electrical WARNING: tel_electrical DDS read queue is filling: 20
of 100 elements
MTHexapod.application WARNING: tel_application DDS read queue is filling: 1
0 of 100 elements
MTHexapod.application WARNING: tel_application DDS read queue is filling: 2
0 of 100 elements
MTHexapod.actuators WARNING: tel_actuators DDS read queue is filling: 20 of
100 elements
setup.MTCS DEBUG: Wait 5.0s for rotator to settle down.
setup.MTCS DEBUG: Workaround for rotator trajectory problem. Moving rotator
to its current position: 0.10
setup.MTCS DEBUG: Wait for MTRotator in position event.
setup.MTCS DEBUG: MTRotator in position: True.
setup.MTCS DEBUG: MTRotator already in position. Handling potential race co
ndition.
setup.MTCS INFO: MTRotator in position: False.
setup.MTCS INFO: MTRotator in position: True.
setup.MTCS DEBUG: MTRotator in position True. Waiting settle time 5.0s
setup.MTCS DEBUG: Sending slew command.
setup.MTCS DEBUG: Scheduling check coroutines
setup.MTCS DEBUG: process as completed...
setup.MTCS DEBUG: Monitor position started.
setup.MTCS DEBUG: Waiting for Target event from mtmount.
setup.MTCS DEBUG: mtmount: <State.ENABLED: 2>
setup.MTCS DEBUG: mpttg: <State.ENABLED: 2>
setup.MTCS DEBUG: mtaos: <State.ENABLED: 2>
setup.MTCS DEBUG: mtm1m3: <State.ENABLED: 2>
setup.MTCS DEBUG: mtm2: <State.ENABLED: 2>
setup.MTCS DEBUG: mthexapod_1: <State.ENABLED: 2>
setup.MTCS DEBUG: mthexapod_2: <State.ENABLED: 2>
setup.MTCS DEBUG: mtrotator: <State.ENABLED: 2>
setup.MTCS DEBUG: mt dome: <State.ENABLED: 2>
setup.MTCS DEBUG: mt dome trajectory: <State.ENABLED: 2>
setup.MTCS DEBUG: Wait for mtmount in position events.
setup.MTCS DEBUG: Wait for dome in position event.
setup.MTCS DEBUG: Wait for MTRotator in position event.
setup.MTCS DEBUG: MTRotator in position: True.
setup.MTCS DEBUG: MTRotator already in position. Handling potential race co
ndition.
```

```
setup.MTCS DEBUG: Wait for MTMount elevation in position event.
setup.MTCS DEBUG: MTMount elevation in position: True.
setup.MTCS DEBUG: MTMount elevation already in position. Handling potential race condition.
setup.MTCS DEBUG: Wait for MTMount azimuth in position event.
setup.MTCS DEBUG: MTMount azimuth in position: True.
setup.MTCS DEBUG: MTMount azimuth already in position. Handling potential race condition.
setup.MTCS DEBUG: Mount target: private_revCode: bdcb00ba, private_sndStamp: 1655776732.4470537, private_rcvStamp: 1655776732.4478555, private_seqNum: 38001, private_identity: MTMount, private_origin: 44621, elevation: 85.3906913532504, elevationVelocity: -0.0006972631279953498, azimuth: 191.13983308801247, azimuthVelocity: 0.04181150970429646, taiTime: 1655776732.5063467, trackId: 5, tracksys: SIDEREAL, radesys: ICRS, priority: 0
setup.MTCS INFO: MTMount elevation in position: False.
setup.MTCS INFO: MTMount azimuth in position: False.
setup.MTCS INFO: MTMount elevation in position: True.
setup.MTCS DEBUG: MTMount elevation in position True. Waiting settle time 3.0s
setup.MTCS INFO: MTRotator in position: False.
setup.MTCS DEBUG: [Tel]: Az = +190.502[ +0.6]; El = +085.399[ -0.0] [Rot]: +000.100[ +0.0] [Dome] Az = +000.000; El = +000.000
setup.MTCS DEBUG: Dome azimuth in position.
setup.MTCS DEBUG: Dome elevation in position.
setup.MTCS INFO: MTMount azimuth in position: True.
setup.MTCS DEBUG: MTMount azimuth in position True. Waiting settle time 3.0s
setup.MTCS INFO: MTRotator in position: True.
setup.MTCS DEBUG: MTRotator in position True. Waiting settle time 3.0s
setup.MTCS DEBUG: Stop tracking.
MTM1M3.powerSupplyData ERROR: tel_powerSupplyData DDS read queue is full (100 elements); data may be lost
MTHexapod.electrical ERROR: tel_electrical DDS read queue is full (100 elements); data may be lost
MTPtg.timeAndDate ERROR: tel_timeAndDate DDS read queue is full (100 elements); data may be lost
MTHexapod.electrical ERROR: tel_electrical DDS read queue is full (100 elements); data may be lost
MTRotator.rotation ERROR: tel_rotation DDS read queue is full (100 elements); data may be lost
MTMount.elevation ERROR: tel_elevation DDS read queue is full (100 elements); data may be lost
MTHexapod.application ERROR: tel_application DDS read queue is full (100 elements); data may be lost
MTHexapod.application ERROR: tel_application DDS read queue is full (100 elements); data may be lost
MTM2.tangentEncoderPositions ERROR: tel_tangentEncoderPositions DDS read queue is full (100 elements); data may be lost
MTPtg.mountStatus ERROR: tel_mountStatus DDS read queue is full (100 elements); data may be lost
MTM1M3.pidData ERROR: tel_pidData DDS read queue is full (100 elements); data may be lost
```

```
MTDome.azimuth ERROR: tel_azimuth DDS read queue is full (100 elements); data may be lost
MTRotator.motors ERROR: tel_motors DDS read queue is full (100 elements); data may be lost
MTHexapod.actuators ERROR: tel_actuators DDS read queue is full (100 elements); data may be lost
MTMount.cameraCableWrap ERROR: tel_cameraCableWrap DDS read queue is full (100 elements); data may be lost
MTM2.powerStatus ERROR: tel_powerStatus DDS read queue is full (100 elements); data may be lost
MTHexapod.actuators ERROR: tel_actuators DDS read queue is full (100 elements); data may be lost
MTRotator.electrical ERROR: tel_electrical DDS read queue is full (100 elements); data may be lost
MTM2.positionIMS ERROR: tel_positionIMS DDS read queue is full (100 elements); data may be lost
MTHexapod.logevent_heartbeat WARNING: evt_heartbeat DDS read queue is filling: 39 of 100 elements
MTMount.azimuth ERROR: tel_azimuth DDS read queue is full (100 elements); data may be lost
MTDome.logevent_azMotion ERROR: evt_azMotion DDS read queue is full (100 elements); data may be lost
MTM2.position ERROR: tel_position DDS read queue is full (100 elements); data may be lost
MTMount.logevent_target ERROR: evt_target DDS read queue is full (100 elements); data may be lost
MTHexapod.logevent_heartbeat WARNING: evt_heartbeat DDS read queue is filling: 39 of 100 elements
MTRotator.ccwFollowingError ERROR: tel_ccwFollowingError DDS read queue is full (100 elements); data may be lost
MTPtg.mountPosition ERROR: tel_mountPosition DDS read queue is full (100 elements); data may be lost
MTM2.netMomentsTotal ERROR: tel_netMomentsTotal DDS read queue is full (100 elements); data may be lost
MTM1M3.outerLoopData ERROR: tel_outerLoopData DDS read queue is full (100 elements); data may be lost
MTMount.logevent_cameraCableWrapTarget ERROR: evt_cameraCableWrapTarget DDS read queue is full (100 elements); data may be lost
MTRotator.logevent_target ERROR: evt_target DDS read queue is full (100 elements); data may be lost
MTPtg.currentTargetStatus ERROR: tel_currentTargetStatus DDS read queue is full (100 elements); data may be lost
MTM2.netForcesTotal ERROR: tel_netForcesTotal DDS read queue is full (100 elements); data may be lost
MTM1M3.inclinometerData ERROR: tel_inclinometerData DDS read queue is full (100 elements); data may be lost
MTM2.ilcData ERROR: tel_ilcData DDS read queue is full (100 elements); data may be lost
MTM1M3.imsData ERROR: tel_imsData DDS read queue is full (100 elements); data may be lost
```

```
Current elevation: 84.4 - current aberration z5
MTM1M3.hardpointMonitorData ERROR: tel_hardpointMonitorData DDS read queue
is full (100 elements); data may be lost
MTM2.forceBalance ERROR: tel_forceBalance DDS read queue is full (100 eleme
nts); data may be lost
MTM2.displacementSensors ERROR: tel_displacementSensors DDS read queue is f
ull (100 elements); data may be lost
MTM1M3.hardpointActuatorData ERROR: tel_hardpointActuatorData DDS read queu
e is full (100 elements); data may be lost
MTM2.axialEncoderPositions ERROR: tel_axialEncoderPositions DDS read queue
is full (100 elements); data may be lost
MTM1M3.forceActuatorData ERROR: tel_forceActuatorData DDS read queue is ful
l (100 elements); data may be lost
MTM1M3.accelerometerData ERROR: tel_accelerometerData DDS read queue is ful
l (100 elements); data may be lost
MTM1M3.logevent_forceActuatorWarning ERROR: evt_forceActuatorWarning DDS re
ad queue is full (100 elements); data may be lost
MTM1M3.logevent_appliedThermalForces ERROR: evt_appliedThermalForces DDS re
ad queue is full (100 elements); data may be lost
MTM1M3.logevent_appliedStaticForces ERROR: evt_appliedStaticForces DDS read
queue is full (100 elements); data may be lost
MTM1M3.logevent_appliedForces ERROR: evt_appliedForces DDS read queue is fu
ll (100 elements); data may be lost
MTM1M3.logevent_appliedElevationForces ERROR: evt_appliedElevationForces DD
S read queue is full (100 elements); data may be lost
MTM1M3.logevent_appliedCylinderForces ERROR: evt_appliedCylinderForces DDS
read queue is full (100 elements); data may be lost
MTM1M3.logevent_appliedBalanceForces ERROR: evt_appliedBalanceForces DDS re
ad queue is full (100 elements); data may be lost
MTM1M3.logevent_appliedAzimuthForces ERROR: evt_appliedAzimuthForces DDS re
ad queue is full (100 elements); data may be lost
MTM1M3.logevent_appliedActiveOpticForces ERROR: evt_appliedActiveOpticForce
s DDS read queue is full (100 elements); data may be lost
MTM1M3.logevent_appliedAberrationForces ERROR: evt_appliedAberrationForces
DDS read queue is full (100 elements); data may be lost
Moving elevation to 85.36 deg
MTM1M3.powerSupplyData ERROR: tel_powerSupplyData DDS read queue is full (1
00 elements); data may be lost
MTHexapod.electrical WARNING: tel_electrical DDS read queue is filling: 40
of 100 elements
MTHexapod.electrical WARNING: tel_electrical DDS read queue is filling: 19
of 100 elements
MTHexapod.application WARNING: tel_application DDS read queue is filling: 4
0 of 100 elements
MTM1M3.pidData ERROR: tel_pidData DDS read queue is full (100 elements); da
ta may be lost
MTHexapod.application WARNING: tel_application DDS read queue is filling: 2
0 of 100 elements
MTHexapod.actuators WARNING: tel_actuators DDS read queue is filling: 19 of
100 elements
```

```
MTHexapod.actuators WARNING: tel_actuators DDS read queue is filling: 40 of
100 elements
MTM1M3.outerLoopData ERROR: tel_outerLoopData DDS read queue is full (100 e
lements); data may be lost
MTM1M3.inclinometerData ERROR: tel_inclinometerData DDS read queue is full
(100 elements); data may be lost
MTM1M3.hardpointMonitorData ERROR: tel_hardpointMonitorData DDS read queue
is full (100 elements); data may be lost
MTM1M3.hardpointActuatorData ERROR: tel_hardpointActuatorData DDS read queu
e is full (100 elements); data may be lost
MTM1M3.forceActuatorData ERROR: tel_forceActuatorData DDS read queue is ful
l (100 elements); data may be lost
MTM1M3.accelerometerData ERROR: tel_accelerometerData DDS read queue is ful
l (100 elements); data may be lost
MTM1M3.logevent_appliedThermalForces ERROR: evt_appliedThermalForces DDS re
ad queue is full (100 elements); data may be lost
MTM1M3.logevent_appliedStaticForces ERROR: evt_appliedStaticForces DDS read
queue is full (100 elements); data may be lost
MTM1M3.logevent_appliedForces ERROR: evt_appliedForces DDS read queue is fu
ll (100 elements); data may be lost
MTM1M3.logevent_appliedElevationForces ERROR: evt_appliedElevationForces DD
S read queue is full (100 elements); data may be lost
MTM1M3.logevent_appliedCylinderForces ERROR: evt_appliedCylinderForces DDS
read queue is full (100 elements); data may be lost
MTM1M3.logevent_appliedBalanceForces ERROR: evt_appliedBalanceForces DDS re
ad queue is full (100 elements); data may be lost
MTM1M3.logevent_appliedAzimuthForces ERROR: evt_appliedAzimuthForces DDS re
ad queue is full (100 elements); data may be lost
MTM1M3.logevent_appliedActiveOpticForces ERROR: evt_appliedActiveOpticForce
s DDS read queue is full (100 elements); data may be lost
MTM1M3.logevent_appliedAberrationForces ERROR: evt_appliedAberrationForces
DDS read queue is full (100 elements); data may be lost
Moving elevation to 85.04 deg
MTHexapod.electrical WARNING: tel_electrical DDS read queue is filling: 10
of 100 elements
MTHexapod.electrical WARNING: tel_electrical DDS read queue is filling: 20
of 100 elements
MTHexapod.application WARNING: tel_application DDS read queue is filling: 1
0 of 100 elements
MTHexapod.application WARNING: tel_application DDS read queue is filling: 2
0 of 100 elements
MTHexapod.actuators WARNING: tel_actuators DDS read queue is filling: 10 of
100 elements
MTHexapod.actuators WARNING: tel_actuators DDS read queue is filling: 20 of
100 elements
Moving elevation to 84.72 deg
MTHexapod.electrical WARNING: tel_electrical DDS read queue is filling: 20
of 100 elements
MTHexapod.electrical WARNING: tel_electrical DDS read queue is filling: 10
of 100 elements
MTHexapod.application WARNING: tel_application DDS read queue is filling: 2
0 of 100 elements
```

```
MTHexapod.application WARNING: tel_application DDS read queue is filling: 1
0 of 100 elements
MTHexapod.actuators WARNING: tel_actuators DDS read queue is filling: 21 of
100 elements
Moving elevation to 84.40 deg
MTHexapod.electrical WARNING: tel_electrical DDS read queue is filling: 20
of 100 elements
MTHexapod.electrical WARNING: tel_electrical DDS read queue is filling: 10
of 100 elements
MTHexapod.application WARNING: tel_application DDS read queue is filling: 2
1 of 100 elements
MTHexapod.actuators WARNING: tel_actuators DDS read queue is filling: 20 of
100 elements
MTHexapod.application WARNING: tel_application DDS read queue is filling: 1
1 of 100 elements
MTHexapod.actuators WARNING: tel_actuators DDS read queue is filling: 10 of
100 elements
setup.MTCS DEBUG: Setting rotator to physical fixed position 0.0 deg. Rotat
or will not track.
MTHexapod.electrical WARNING: tel_electrical DDS read queue is filling: 21
of 100 elements
MTHexapod.electrical WARNING: tel_electrical DDS read queue is filling: 10
of 100 elements
MTHexapod.application WARNING: tel_application DDS read queue is filling: 2
1 of 100 elements
MTHexapod.application WARNING: tel_application DDS read queue is filling: 1
0 of 100 elements
MTHexapod.actuators WARNING: tel_actuators DDS read queue is filling: 20 of
100 elements
setup.MTCS DEBUG: Wait 5.0s for rotator to settle down.
setup.MTCS DEBUG: Workaround for rotator trajectory problem. Moving rotator
to its current position: -0.10
setup.MTCS DEBUG: Wait for MTRotator in position event.
setup.MTCS DEBUG: MTRotator in position: True.
setup.MTCS DEBUG: MTRotator already in position. Handling potential race co
ndition.
setup.MTCS INFO: MTRotator in position: False.
setup.MTCS INFO: MTRotator in position: True.
setup.MTCS DEBUG: MTRotator in position True. Waiting settle time 5.0s
setup.MTCS DEBUG: Sending slew command.
setup.MTCS DEBUG: Scheduling check coroutines
setup.MTCS DEBUG: process as completed...
setup.MTCS DEBUG: Monitor position started.
setup.MTCS DEBUG: Waiting for Target event from mtmount.
setup.MTCS DEBUG: mtmount: <State.ENABLED: 2>
setup.MTCS DEBUG: mpttg: <State.ENABLED: 2>
setup.MTCS DEBUG: mtaos: <State.ENABLED: 2>
setup.MTCS DEBUG: mtm1m3: <State.ENABLED: 2>
setup.MTCS DEBUG: mtm2: <State.ENABLED: 2>
setup.MTCS DEBUG: mthexapod_1: <State.ENABLED: 2>
setup.MTCS DEBUG: mthexapod_2: <State.ENABLED: 2>
```

```
setup.MTCS DEBUG: mtrotator: <State.ENABLED: 2>
setup.MTCS DEBUG: mtdome: <State.ENABLED: 2>
setup.MTCS DEBUG: mtdometrajectory: <State.ENABLED: 2>
setup.MTCS DEBUG: Wait for mtmount in position events.
setup.MTCS DEBUG: Wait for dome in position event.
setup.MTCS DEBUG: Wait for MTRotator in position event.
setup.MTCS DEBUG: MTRotator in position: True.
setup.MTCS DEBUG: MTMount already in position. Handling potential race condition.
setup.MTCS DEBUG: Wait for MTMount elevation in position event.
setup.MTCS DEBUG: MTMount elevation in position: True.
setup.MTCS DEBUG: MTMount elevation already in position. Handling potential race condition.
setup.MTCS DEBUG: Wait for MTMount azimuth in position event.
setup.MTCS DEBUG: MTMount azimuth in position: True.
setup.MTCS DEBUG: MTMount azimuth already in position. Handling potential race condition.
setup.MTCS DEBUG: Mount target: private_revCode: bdcb00ba, private_sndStamp: 1655776803.3371928, private_rcvStamp: 1655776803.3375301, private_seqNum: 38892, private_identity: MTMount, private_origin: 44621, elevation: 84.39076913566711, elevationVelocity: -0.000690400055019345, azimuth: 191.02899461680366, azimuthVelocity: 0.033959015139288506, taiTime: 1655776803.3964846, trackId: 6, tracksys: SIDEREAL, radesys: ICRS, priority: 0
setup.MTCS INFO: MTMount elevation in position: False.
setup.MTCS INFO: MTMount azimuth in position: False.
setup.MTCS INFO: MTMount elevation in position: True.
setup.MTCS DEBUG: MTMount elevation in position True. Waiting settle time 3.0s
setup.MTCS INFO: MTRotator in position: False.
setup.MTCS INFO: MTRotator in position: True.
setup.MTCS DEBUG: MTRotator in position True. Waiting settle time 3.0s
setup.MTCS INFO: MTMount azimuth in position: True.
setup.MTCS DEBUG: MTMount azimuth in position True. Waiting settle time 3.0s
setup.MTCS DEBUG: [Tel]: Az = +190.510[ +0.5]; El = +084.395[ -0.0] [Rot]: -000.100[ -0.0] [Dome] Az = +000.000; El = +000.000
setup.MTCS DEBUG: Dome azimuth in position.
setup.MTCS DEBUG: Dome elevation in position.
setup.MTCS DEBUG: Stop tracking.
MTRotator.rotation ERROR: tel_rotation DDS read queue is full (100 elements); data may be lost
MTHexapod.electrical ERROR: tel_electrical DDS read queue is full (100 elements); data may be lost
MTPtg.timeAndDate ERROR: tel_timeAndDate DDS read queue is full (100 elements); data may be lost
MTM1M3.powerSupplyData ERROR: tel_powerSupplyData DDS read queue is full (100 elements); data may be lost
MTHexapod.electrical ERROR: tel_electrical DDS read queue is full (100 elements); data may be lost
MTMount.elevation ERROR: tel_elevation DDS read queue is full (100 elements); data may be lost
```

```
MTHexapod.application ERROR: tel_application DDS read queue is full (100 elements); data may be lost
MTM1M3.pidData ERROR: tel_pidData DDS read queue is full (100 elements); data may be lost
MTHexapod.application ERROR: tel_application DDS read queue is full (100 elements); data may be lost
MTRotator.motors ERROR: tel_motors DDS read queue is full (100 elements); data may be lost
MTPtg.mountStatus ERROR: tel_mountStatus DDS read queue is full (100 elements); data may be lost
MTM2.tangentEncoderPositions ERROR: tel_tangentEncoderPositions DDS read queue is full (100 elements); data may be lost
MTHexapod.actuators ERROR: tel_actuators DDS read queue is full (100 elements); data may be lost
MTPtg.mountPosition ERROR: tel_mountPosition DDS read queue is full (100 elements); data may be lost
MTHexapod.logevent_heartbeat WARNING: evt_heartbeat DDS read queue is filling: 39 of 100 elements
MTDome.azimuth ERROR: tel_azimuth DDS read queue is full (100 elements); data may be lost
MTMount.cameraCableWrap ERROR: tel_cameraCableWrap DDS read queue is full (100 elements); data may be lost
MTM2.powerStatus ERROR: tel_powerStatus DDS read queue is full (100 elements); data may be lost
MTRotator.electrical ERROR: tel_electrical DDS read queue is full (100 elements); data may be lost
MTM2.positionIMS ERROR: tel_positionIMS DDS read queue is full (100 elements); data may be lost
MTMount.azimuth ERROR: tel_azimuth DDS read queue is full (100 elements); data may be lost
MTPtg.currentTargetStatus ERROR: tel_currentTargetStatus DDS read queue is full (100 elements); data may be lost
MTRotator.ccwFollowingError ERROR: tel_ccwFollowingError DDS read queue is full (100 elements); data may be lost
MTM2.position ERROR: tel_position DDS read queue is full (100 elements); data may be lost
MTDome.logevent_azMotion ERROR: evt_azMotion DDS read queue is full (100 elements); data may be lost
MTHexapod.actuators ERROR: tel_actuators DDS read queue is full (100 elements); data may be lost
MTHexapod.logevent_heartbeat WARNING: evt_heartbeat DDS read queue is filling: 39 of 100 elements
MTM2.netMomentsTotal ERROR: tel_netMomentsTotal DDS read queue is full (100 elements); data may be lost
MTMount.logevent_target ERROR: evt_target DDS read queue is full (100 elements); data may be lost
MTM1M3.outerLoopData ERROR: tel_outerLoopData DDS read queue is full (100 elements); data may be lost
MTRotator.logevent_target ERROR: evt_target DDS read queue is full (100 elements); data may be lost
MTM2.netForcesTotal ERROR: tel_netForcesTotal DDS read queue is full (100 elements); data may be lost
```

```
Current elevation: 83.4 - current aberration z7
MTM1M3.inclinometerData ERROR: tel_inclinometerData DDS read queue is full
(100 elements); data may be lost
MTM2.ilcData ERROR: tel_ilcData DDS read queue is full (100 elements); data
may be lost
MTMount.logevent_cameraCableWrapTarget ERROR: evt_cameraCableWrapTarget DDS
read queue is full (100 elements); data may be lost
MTM2.forceBalance ERROR: tel_forceBalance DDS read queue is full (100 eleme
nts); data may be lost
MTM2.displacementSensors ERROR: tel_displacementSensors DDS read queue is f
ull (100 elements); data may be lost
MTM1M3.imsData ERROR: tel_imsData DDS read queue is full (100 elements); da
ta may be lost
MTM2.axialEncoderPositions ERROR: tel_axialEncoderPositions DDS read queue
is full (100 elements); data may be lost
MTM1M3.hardpointMonitorData ERROR: tel_hardpointMonitorData DDS read queue
is full (100 elements); data may be lost
MTM1M3.hardpointActuatorData ERROR: tel_hardpointActuatorData DDS read queu
e is full (100 elements); data may be lost
MTM1M3.forceActuatorData ERROR: tel_forceActuatorData DDS read queue is ful
l (100 elements); data may be lost
MTM1M3.accelerometerData ERROR: tel_accelerometerData DDS read queue is ful
l (100 elements); data may be lost
MTM1M3.logevent_forceActuatorWarning ERROR: evt_forceActuatorWarning DDS re
ad queue is full (100 elements); data may be lost
MTM1M3.logevent_appliedThermalForces ERROR: evt_appliedThermalForces DDS re
ad queue is full (100 elements); data may be lost
MTM1M3.logevent_appliedStaticForces ERROR: evt_appliedStaticForces DDS read
queue is full (100 elements); data may be lost
MTM1M3.logevent_appliedForces ERROR: evt_appliedForces DDS read queue is fu
ll (100 elements); data may be lost
MTM1M3.logevent_appliedElevationForces ERROR: evt_appliedElevationForces DD
S read queue is full (100 elements); data may be lost
MTM1M3.logevent_appliedCylinderForces ERROR: evt_appliedCylinderForces DDS
read queue is full (100 elements); data may be lost
MTM1M3.logevent_appliedBalanceForces ERROR: evt_appliedBalanceForces DDS re
ad queue is full (100 elements); data may be lost
MTM1M3.logevent_appliedAzimuthForces ERROR: evt_appliedAzimuthForces DDS re
ad queue is full (100 elements); data may be lost
MTM1M3.logevent_appliedActiveOpticForces ERROR: evt_appliedActiveOpticForce
s DDS read queue is full (100 elements); data may be lost
MTM1M3.logevent_appliedAberrationForces ERROR: evt_appliedAberrationForces
DDS read queue is full (100 elements); data may be lost
Moving elevation to 84.36 deg
MTHexapod.electrical WARNING: tel_electrical DDS read queue is filling: 20
of 100 elements
MTHexapod.electrical WARNING: tel_electrical DDS read queue is filling: 40
of 100 elements
MTM1M3.powerSupplyData ERROR: tel_powerSupplyData DDS read queue is full (1
00 elements); data may be lost
```

```
MTHexapod.application WARNING: tel_application DDS read queue is filling: 2  
0 of 100 elements  
MTHexapod.actuators WARNING: tel_actuators DDS read queue is filling: 19 of  
100 elements  
MTHexapod.application WARNING: tel_application DDS read queue is filling: 4  
1 of 100 elements  
MTM1M3.pidData ERROR: tel_pidData DDS read queue is full (100 elements); da  
ta may be lost  
MTHexapod.actuators WARNING: tel_actuators DDS read queue is filling: 40 of  
100 elements  
MTM1M3.outerLoopData ERROR: tel_outerLoopData DDS read queue is full (100 e  
lements); data may be lost  
MTM1M3.inclinometerData ERROR: tel_inclinometerData DDS read queue is full  
(100 elements); data may be lost  
MTM1M3.hardpointMonitorData ERROR: tel_hardpointMonitorData DDS read queue  
is full (100 elements); data may be lost  
MTM1M3.hardpointActuatorData ERROR: tel_hardpointActuatorData DDS read que  
ue is full (100 elements); data may be lost  
MTM1M3.forceActuatorData ERROR: tel_forceActuatorData DDS read queue is ful  
l (100 elements); data may be lost  
MTM1M3.accelerometerData ERROR: tel_accelerometerData DDS read queue is ful  
l (100 elements); data may be lost  
MTM1M3.logevent_appliedThermalForces ERROR: evt_appliedThermalForces DDS re  
ad queue is full (100 elements); data may be lost  
MTM1M3.logevent_appliedStaticForces ERROR: evt_appliedStaticForces DDS read  
queue is full (100 elements); data may be lost  
MTM1M3.logevent_appliedForces ERROR: evt_appliedForces DDS read queue is fu  
ll (100 elements); data may be lost  
MTM1M3.logevent_appliedElevationForces ERROR: evt_appliedElevationForces DD  
S read queue is full (100 elements); data may be lost  
MTM1M3.logevent_appliedCylinderForces ERROR: evt_appliedCylinderForces DDS  
read queue is full (100 elements); data may be lost  
MTM1M3.logevent_appliedBalanceForces ERROR: evt_appliedBalanceForces DDS re  
ad queue is full (100 elements); data may be lost  
MTM1M3.logevent_appliedAzimuthForces ERROR: evt_appliedAzimuthForces DDS re  
ad queue is full (100 elements); data may be lost  
MTM1M3.logevent_appliedActiveOpticForces ERROR: evt_appliedActiveOpticForc  
es DDS read queue is full (100 elements); data may be lost  
MTM1M3.logevent_appliedAberrationForces ERROR: evt_appliedAberrationForces  
DDS read queue is full (100 elements); data may be lost  
Moving elevation to 84.04 deg  
MTHexapod.electrical WARNING: tel_electrical DDS read queue is filling: 10  
of 100 elements  
MTHexapod.electrical WARNING: tel_electrical DDS read queue is filling: 20  
of 100 elements  
MTHexapod.application WARNING: tel_application DDS read queue is filling: 1  
0 of 100 elements  
MTHexapod.application WARNING: tel_application DDS read queue is filling: 2  
0 of 100 elements  
MTHexapod.actuators WARNING: tel_actuators DDS read queue is filling: 19 of  
100 elements  
Moving elevation to 83.72 deg
```

```
MTHexapod.electrical WARNING: tel_electrical DDS read queue is filling: 20
of 100 elements
MTHexapod.electrical WARNING: tel_electrical DDS read queue is filling: 10
of 100 elements
MTHexapod.application WARNING: tel_application DDS read queue is filling: 2
0 of 100 elements
MTHexapod.application WARNING: tel_application DDS read queue is filling: 1
0 of 100 elements
MTHexapod.actuators WARNING: tel_actuators DDS read queue is filling: 19 of
100 elements
Moving elevation to 83.40 deg
MTHexapod.electrical WARNING: tel_electrical DDS read queue is filling: 10
of 100 elements
MTHexapod.electrical WARNING: tel_electrical DDS read queue is filling: 20
of 100 elements
MTHexapod.application WARNING: tel_application DDS read queue is filling: 1
0 of 100 elements
MTHexapod.application WARNING: tel_application DDS read queue is filling: 2
0 of 100 elements
MTHexapod.actuators WARNING: tel_actuators DDS read queue is filling: 20 of
100 elements
setup.MTCS DEBUG: Setting rotator to physical fixed position 0.0 deg. Rotat
or will not track.
MTHexapod.electrical WARNING: tel_electrical DDS read queue is filling: 10
of 100 elements
MTHexapod.electrical WARNING: tel_electrical DDS read queue is filling: 20
of 100 elements
MTHexapod.application WARNING: tel_application DDS read queue is filling: 2
1 of 100 elements
MTHexapod.application WARNING: tel_application DDS read queue is filling: 1
1 of 100 elements
MTHexapod.actuators WARNING: tel_actuators DDS read queue is filling: 20 of
100 elements
MTHexapod.actuators WARNING: tel_actuators DDS read queue is filling: 10 of
100 elements
setup.MTCS DEBUG: Wait 5.0s for rotator to settle down.
setup.MTCS DEBUG: Workaround for rotator trajectory problem. Moving rotator
to its current position: -0.10
setup.MTCS DEBUG: Wait for MTRotator in position event.
setup.MTCS DEBUG: MTRotator in position: False.
setup.MTCS INFO: MTRotator in position: True.
setup.MTCS DEBUG: MTRotator in position True. Waiting settle time 5.0s
setup.MTCS DEBUG: Sending slew command.
setup.MTCS DEBUG: Scheduling check coroutines
setup.MTCS DEBUG: process as completed...
setup.MTCS DEBUG: Monitor position started.
setup.MTCS DEBUG: Waiting for Target event from mtmount.
setup.MTCS DEBUG: mtmount: <State.ENABLED: 2>
setup.MTCS DEBUG: mpttg: <State.ENABLED: 2>
setup.MTCS DEBUG: mtaos: <State.ENABLED: 2>
setup.MTCS DEBUG: mtm1m3: <State.ENABLED: 2>
setup.MTCS DEBUG: mtm2: <State.ENABLED: 2>
```

```
setup.MTCS DEBUG: mthexapod_1: <State.ENABLED: 2>
setup.MTCS DEBUG: mthexapod_2: <State.ENABLED: 2>
setup.MTCS DEBUG: mtrotator: <State.ENABLED: 2>
setup.MTCS DEBUG: mt dome: <State.ENABLED: 2>
setup.MTCS DEBUG: mt dometrajectory: <State.ENABLED: 2>
setup.MTCS DEBUG: Wait for mtmount in position events.
setup.MTCS DEBUG: Wait for dome in position event.
setup.MTCS DEBUG: Wait for MTRotator in position event.
setup.MTCS DEBUG: MTRotator in position: True.
setup.MTCS DEBUG: MTRotator already in position. Handling potential race condition.
setup.MTCS DEBUG: Wait for MTMount elevation in position event.
setup.MTCS DEBUG: MTMount elevation in position: True.
setup.MTCS DEBUG: MTMount elevation already in position. Handling potential race condition.
setup.MTCS DEBUG: Wait for MTMount azimuth in position event.
setup.MTCS DEBUG: MTMount azimuth in position: True.
setup.MTCS DEBUG: MTMount azimuth already in position. Handling potential race condition.
setup.MTCS DEBUG: Mount target: private_revCode: bdcb00ba, private_sndStamp: 1655776872.1743674, private_rcvStamp: 1655776872.174726, private_seqNum: 39746, private_identity: MTMount, private_origin: 44621, elevation: 83.3909709458747, elevationVelocity: -0.0006852400014736397, azimuth: 190.94567998744589, azimuthVelocity: 0.028473908530131934, taiTime: 1655776872.2335258, trackId: 7, tracksys: SIDEREAL, radesys: ICRS, priority: 0
setup.MTCS INFO: MTMount elevation in position: False.
setup.MTCS INFO: MTMount azimuth in position: False.
setup.MTCS INFO: MTMount elevation in position: True.
setup.MTCS DEBUG: MTMount elevation in position True. Waiting settle time 3.0s
setup.MTCS INFO: MTRotator in position: False.
setup.MTCS INFO: MTMount azimuth in position: True.
setup.MTCS DEBUG: MTMount azimuth in position True. Waiting settle time 3.0s
setup.MTCS INFO: MTRotator in position: True.
setup.MTCS DEBUG: MTRotator in position True. Waiting settle time 3.0s
setup.MTCS DEBUG: [Tel]: Az = +190.503[ +0.4]; El = +083.399[ -0.0] [Rot]: -000.100[ +0.0] [Dome] Az = +000.000; El = +000.000
setup.MTCS DEBUG: Dome azimuth in position.
setup.MTCS DEBUG: Dome elevation in position.
setup.MTCS DEBUG: Stop tracking.
MTM1M3.powerSupplyData ERROR: tel_powerSupplyData DDS read queue is full (100 elements); data may be lost
MTRotator.rotation ERROR: tel_rotation DDS read queue is full (100 elements); data may be lost
MTHexapod.electrical ERROR: tel_electrical DDS read queue is full (100 elements); data may be lost
MTPtg.timeAndDate ERROR: tel_timeAndDate DDS read queue is full (100 elements); data may be lost
MTMount.elevation ERROR: tel_elevation DDS read queue is full (100 elements); data may be lost
```

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MTHexapod.electrical ERROR: tel_electrical DDS read queue is full (100 elements); data may be lost
MTHexapod.application ERROR: tel_application DDS read queue is full (100 elements); data may be lost
MTRotator.motors ERROR: tel_motors DDS read queue is full (100 elements); data may be lost
MTHexapod.actuators ERROR: tel_actuators DDS read queue is full (100 elements); data may be lost
MTM2.tangentEncoderPositions ERROR: tel_tangentEncoderPositions DDS read queue is full (100 elements); data may be lost
MTPtg.mountStatus ERROR: tel_mountStatus DDS read queue is full (100 elements); data may be lost
MTMount.cameraCableWrap ERROR: tel_cameraCableWrap DDS read queue is full (100 elements); data may be lost
MTHexapod.application ERROR: tel_application DDS read queue is full (100 elements); data may be lost
MTDome.azimuth ERROR: tel_azimuth DDS read queue is full (100 elements); data may be lost
MTPtg.mountPosition ERROR: tel_mountPosition DDS read queue is full (100 elements); data may be lost
MTHexapod.actuators ERROR: tel_actuators DDS read queue is full (100 elements); data may be lost
MTM2.powerStatus ERROR: tel_powerStatus DDS read queue is full (100 elements); data may be lost
MTM1M3.pidData ERROR: tel_pidData DDS read queue is full (100 elements); data may be lost
MTRotator.electrical ERROR: tel_electrical DDS read queue is full (100 elements); data may be lost
MTHexapod.logevent_heartbeat WARNING: evt_heartbeat DDS read queue is filling: 39 of 100 elements
MTM2.positionIMS ERROR: tel_positionIMS DDS read queue is full (100 elements); data may be lost
MTMount.azimuth ERROR: tel_azimuth DDS read queue is full (100 elements); data may be lost
MTDome.logevent_azMotion ERROR: evt_azMotion DDS read queue is full (100 elements); data may be lost
MTM2.position ERROR: tel_position DDS read queue is full (100 elements); data may be lost
MTPtg.currentTargetStatus ERROR: tel_currentTargetStatus DDS read queue is full (100 elements); data may be lost
MTMount.logevent_target ERROR: evt_target DDS read queue is full (100 elements); data may be lost
MTHexapod.logevent_heartbeat WARNING: evt_heartbeat DDS read queue is filling: 39 of 100 elements
MTM2.netMomentsTotal ERROR: tel_netMomentsTotal DDS read queue is full (100 elements); data may be lost
MTM1M3.outerLoopData ERROR: tel_outerLoopData DDS read queue is full (100 elements); data may be lost
MTRotator.ccwFollowingError ERROR: tel_ccwFollowingError DDS read queue is full (100 elements); data may be lost
MTM2.netForcesTotal ERROR: tel_netForcesTotal DDS read queue is full (100 elements); data may be lost
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MTMount.logevent_cameraCableWrapTarget ERROR: evt_cameraCableWrapTarget DDS  
read queue is full (100 elements); data may be lost  
MTRotator.logevent_target ERROR: evt_target DDS read queue is full (100 ele-  
ments); data may be lost  
MTM1M3.inclinometerData ERROR: tel_inclinometerData DDS read queue is full  
(100 elements); data may be lost  
MTM2.ilcData ERROR: tel_ilcData DDS read queue is full (100 elements); data  
may be lost  
MTM2.forceBalance ERROR: tel_forceBalance DDS read queue is full (100 ele-  
ments); data may be lost
```

```
Current elevation: 82.4 - current aberration z9  
MTM2.displacementSensors ERROR: tel_displacementSensors DDS read queue is f-  
ull (100 elements); data may be lost  
MTM1M3.imsData ERROR: tel_imsData DDS read queue is full (100 elements); da-  
ta may be lost  
MTM2.axialEncoderPositions ERROR: tel_axialEncoderPositions DDS read queue  
is full (100 elements); data may be lost  
MTM1M3.hardpointMonitorData ERROR: tel_hardpointMonitorData DDS read queue  
is full (100 elements); data may be lost  
MTM1M3.hardpointActuatorData ERROR: tel_hardpointActuatorData DDS read queu-  
e is full (100 elements); data may be lost  
MTM1M3.forceActuatorData ERROR: tel_forceActuatorData DDS read queue is ful-  
l (100 elements); data may be lost  
MTM1M3.accelerometerData ERROR: tel_accelerometerData DDS read queue is ful-  
l (100 elements); data may be lost  
MTM1M3.logevent_forceActuatorWarning ERROR: evt_forceActuatorWarning DDS re-  
ad queue is full (100 elements); data may be lost  
MTM1M3.logevent_appliedThermalForces ERROR: evt_appliedThermalForces DDS re-  
ad queue is full (100 elements); data may be lost  
MTM1M3.logevent_appliedStaticForces ERROR: evt_appliedStaticForces DDS read  
queue is full (100 elements); data may be lost  
MTM1M3.logevent_appliedForces ERROR: evt_appliedForces DDS read queue is fu-  
ll (100 elements); data may be lost  
MTM1M3.logevent_appliedElevationForces ERROR: evt_appliedElevationForces DD-  
S read queue is full (100 elements); data may be lost  
MTM1M3.logevent_appliedCylinderForces ERROR: evt_appliedCylinderForces DDS  
read queue is full (100 elements); data may be lost  
MTM1M3.logevent_appliedBalanceForces ERROR: evt_appliedBalanceForces DDS re-  
ad queue is full (100 elements); data may be lost  
MTM1M3.logevent_appliedAzimuthForces ERROR: evt_appliedAzimuthForces DDS re-  
ad queue is full (100 elements); data may be lost  
MTM1M3.logevent_appliedActiveOpticForces ERROR: evt_appliedActiveOpticForces  
DDS read queue is full (100 elements); data may be lost  
MTM1M3.logevent_appliedAberrationForces ERROR: evt_appliedAberrationForces  
DDS read queue is full (100 elements); data may be lost  
Moving elevation to 83.36 deg  
MTHexapod.electrical WARNING: tel_electrical DDS read queue is filling: 20  
of 100 elements  
MTHexapod.electrical WARNING: tel_electrical DDS read queue is filling: 40  
of 100 elements
```

```
MTM1M3.powerSupplyData ERROR: tel_powerSupplyData DDS read queue is full (100 elements); data may be lost
MTHexapod.application WARNING: tel_application DDS read queue is filling: 20 of 100 elements
MTHexapod.application WARNING: tel_application DDS read queue is filling: 40 of 100 elements
MTHexapod.actuators WARNING: tel_actuators DDS read queue is filling: 19 of 100 elements
MTM1M3.pidData ERROR: tel_pidData DDS read queue is full (100 elements); data may be lost
MTHexapod.actuators WARNING: tel_actuators DDS read queue is filling: 39 of 100 elements
MTM1M3.outerLoopData ERROR: tel_outerLoopData DDS read queue is full (100 elements); data may be lost
MTM1M3.inclinometerData ERROR: tel_inclinometerData DDS read queue is full (100 elements); data may be lost
MTM1M3.hardpointMonitorData ERROR: tel_hardpointMonitorData DDS read queue is full (100 elements); data may be lost
MTM1M3.hardpointActuatorData ERROR: tel_hardpointActuatorData DDS read queue is full (100 elements); data may be lost
MTM1M3.forceActuatorData ERROR: tel_forceActuatorData DDS read queue is full (100 elements); data may be lost
MTM1M3.accelerometerData ERROR: tel_accelerometerData DDS read queue is full (100 elements); data may be lost
MTM1M3.logevent_appliedThermalForces ERROR: evt_appliedThermalForces DDS read queue is full (100 elements); data may be lost
MTM1M3.logevent_appliedStaticForces ERROR: evt_appliedStaticForces DDS read queue is full (100 elements); data may be lost
MTM1M3.logevent_appliedForces ERROR: evt_appliedForces DDS read queue is full (100 elements); data may be lost
MTM1M3.logevent_appliedElevationForces ERROR: evt_appliedElevationForces DDS read queue is full (100 elements); data may be lost
MTM1M3.logevent_appliedCylinderForces ERROR: evt_appliedCylinderForces DDS read queue is full (100 elements); data may be lost
MTM1M3.logevent_appliedBalanceForces ERROR: evt_appliedBalanceForces DDS read queue is full (100 elements); data may be lost
MTM1M3.logevent_appliedAzimuthForces ERROR: evt_appliedAzimuthForces DDS read queue is full (100 elements); data may be lost
MTM1M3.logevent_appliedActiveOpticForces ERROR: evt_appliedActiveOpticForces DDS read queue is full (100 elements); data may be lost
MTM1M3.logevent_appliedAberrationForces ERROR: evt_appliedAberrationForces DDS read queue is full (100 elements); data may be lost
Moving elevation to 83.04 deg
MTHexapod.electrical WARNING: tel_electrical DDS read queue is filling: 10 of 100 elements
MTHexapod.electrical WARNING: tel_electrical DDS read queue is filling: 20 of 100 elements
MTHexapod.application WARNING: tel_application DDS read queue is filling: 10 of 100 elements
MTHexapod.application WARNING: tel_application DDS read queue is filling: 20 of 100 elements
MTHexapod.actuators WARNING: tel_actuators DDS read queue is filling: 20 of 100 elements
```

```
Moving elevation to 82.72 deg
| MTHexapod.electrical WARNING: tel_electrical DDS read queue is filling: 10
|   of 100 elements
| MTHexapod.electrical WARNING: tel_electrical DDS read queue is filling: 20
|   of 100 elements
| MTHexapod.application WARNING: tel_application DDS read queue is filling: 1
|   of 100 elements
| MTHexapod.application WARNING: tel_application DDS read queue is filling: 2
|   of 100 elements
| MTHexapod.actuators WARNING: tel_actuators DDS read queue is filling: 10 of
|   100 elements
| MTHexapod.actuators WARNING: tel_actuators DDS read queue is filling: 20 of
|   100 elements
Moving elevation to 82.40 deg
| MTHexapod.electrical WARNING: tel_electrical DDS read queue is filling: 21
|   of 100 elements
| MTHexapod.electrical WARNING: tel_electrical DDS read queue is filling: 10
|   of 100 elements
| MTHexapod.application WARNING: tel_application DDS read queue is filling: 2
|   of 100 elements
| MTHexapod.application WARNING: tel_application DDS read queue is filling: 1
|   of 100 elements
| MTHexapod.actuators WARNING: tel_actuators DDS read queue is filling: 20 of
|   100 elements
| setup.MTCS DEBUG: Setting rotator to physical fixed position 0.0 deg. Rotat
| or will not track.
| MTHexapod.electrical WARNING: tel_electrical DDS read queue is filling: 10
|   of 100 elements
| MTHexapod.electrical WARNING: tel_electrical DDS read queue is filling: 20
|   of 100 elements
| MTHexapod.application WARNING: tel_application DDS read queue is filling: 1
|   of 100 elements
| MTHexapod.application WARNING: tel_application DDS read queue is filling: 2
|   of 100 elements
| MTHexapod.actuators WARNING: tel_actuators DDS read queue is filling: 19 of
|   100 elements
| setup.MTCS DEBUG: Wait 5.0s for rotator to settle down.
| setup.MTCS DEBUG: Workaround for rotator trajectory problem. Moving rotator
| to its current position: 0.10
| setup.MTCS DEBUG: Wait for MTRotator in position event.
| setup.MTCS DEBUG: MTRotator in position: True.
| setup.MTCS DEBUG: MTRotator already in position. Handling potential race co
| ndition.
| setup.MTCS INFO: MTRotator in position: False.
| setup.MTCS INFO: MTRotator in position: True.
| setup.MTCS DEBUG: MTRotator in position True. Waiting settle time 5.0s
| setup.MTCS DEBUG: Sending slew command.
| setup.MTCS DEBUG: Scheduling check coroutines
| setup.MTCS DEBUG: process as completed...
| setup.MTCS DEBUG: Monitor position started.
| setup.MTCS DEBUG: Waiting for Target event from mtmount.
| setup.MTCS DEBUG: mtmount: <State.ENABLED: 2>
```

```
setup.MTCS DEBUG: mtptg: <State.ENABLED: 2>
setup.MTCS DEBUG: mtaos: <State.ENABLED: 2>
setup.MTCS DEBUG: mtm1m3: <State.ENABLED: 2>
setup.MTCS DEBUG: mtm2: <State.ENABLED: 2>
setup.MTCS DEBUG: mthexapod_1: <State.ENABLED: 2>
setup.MTCS DEBUG: mthexapod_2: <State.ENABLED: 2>
setup.MTCS DEBUG: mtrotator: <State.ENABLED: 2>
setup.MTCS DEBUG: mt dome: <State.ENABLED: 2>
setup.MTCS DEBUG: mt dometrajectory: <State.ENABLED: 2>
setup.MTCS DEBUG: Wait for mtmount in position events.
setup.MTCS DEBUG: Wait for dome in position event.
setup.MTCS DEBUG: Wait for MTRotator in position event.
setup.MTCS DEBUG: MTRotator in position: True.
setup.MTCS DEBUG: MTRotator already in position. Handling potential race condition.
setup.MTCS DEBUG: Wait for MTMount elevation in position event.
setup.MTCS DEBUG: MTMount elevation in position: True.
setup.MTCS DEBUG: MTMount elevation already in position. Handling potential race condition.
setup.MTCS DEBUG: Wait for MTMount azimuth in position event.
setup.MTCS DEBUG: MTMount azimuth in position: True.
setup.MTCS DEBUG: MTMount azimuth already in position. Handling potential race condition.
setup.MTCS DEBUG: Mount target: private_revCode: bdcb00ba, private_sndStamp: 1655776941.0117965, private_rcvStamp: 1655776941.012125, private_seqNum: 40600, private_identity: MTMount, private_origin: 44621, elevation: 82.3912620920756, elevationVelocity: -0.0006812078186833447, azimuth: 190.88058957903766, azimuthVelocity: 0.024423448456732864, taiTime: 1655776941.0711145, trackId: 8, tracksys: SIDEREAL, radesys: ICRS, priority: 0
setup.MTCS INFO: MTMount elevation in position: False.
setup.MTCS INFO: MTMount azimuth in position: False.
setup.MTCS INFO: MTMount elevation in position: True.
setup.MTCS DEBUG: MTMount elevation in position True. Waiting settle time 3.0s
setup.MTCS INFO: MTRotator in position: False.
setup.MTCS INFO: MTMount azimuth in position: True.
setup.MTCS DEBUG: MTMount azimuth in position True. Waiting settle time 3.0s
setup.MTCS INFO: MTRotator in position: True.
setup.MTCS DEBUG: MTRotator in position True. Waiting settle time 3.0s
setup.MTCS DEBUG: [Tel]: Az = +190.507[ +0.4]; El = +082.396[ -0.0] [Rot]: +000.100[ +0.0] [Dome] Az = +000.000; El = +000.000
setup.MTCS DEBUG: Dome azimuth in position.
setup.MTCS DEBUG: Dome elevation in position.
setup.MTCS DEBUG: Stop tracking.
MTHexapod.electrical ERROR: tel_electrical DDS read queue is full (100 elements); data may be lost
MTM1M3.powerSupplyData ERROR: tel_powerSupplyData DDS read queue is full (100 elements); data may be lost
MTMount.elevation ERROR: tel_elevation DDS read queue is full (100 elements); data may be lost
```

```
MTPtg.timeAndDate ERROR: tel_timeAndDate DDS read queue is full (100 elements); data may be lost
MTRotator.rotation ERROR: tel_rotation DDS read queue is full (100 elements); data may be lost
MTHexapod.electrical ERROR: tel_electrical DDS read queue is full (100 elements); data may be lost
MTMount.cameraCableWrap ERROR: tel_cameraCableWrap DDS read queue is full (100 elements); data may be lost
MTM2.tangentEncoderPositions ERROR: tel_tangentEncoderPositions DDS read queue is full (100 elements); data may be lost
MTHexapod.application ERROR: tel_application DDS read queue is full (100 elements); data may be lost
MTHexapod.application ERROR: tel_application DDS read queue is full (100 elements); data may be lost
MTRotator.motors ERROR: tel_motors DDS read queue is full (100 elements); data may be lost
MTPtg.mountStatus ERROR: tel_mountStatus DDS read queue is full (100 elements); data may be lost
MTM2.powerStatus ERROR: tel_powerStatus DDS read queue is full (100 elements); data may be lost
MTHexapod.actuators ERROR: tel_actuators DDS read queue is full (100 elements); data may be lost
MTRotator.electrical ERROR: tel_electrical DDS read queue is full (100 elements); data may be lost
MTDome.azimuth ERROR: tel_azimuth DDS read queue is full (100 elements); data may be lost
MTMount.azimuth ERROR: tel_azimuth DDS read queue is full (100 elements); data may be lost
MTPtg.mountPosition ERROR: tel_mountPosition DDS read queue is full (100 elements); data may be lost
MTM1M3.pidData ERROR: tel_pidData DDS read queue is full (100 elements); data may be lost
MTM2.positionIMS ERROR: tel_positionIMS DDS read queue is full (100 elements); data may be lost
MTPtg.currentTargetStatus ERROR: tel_currentTargetStatus DDS read queue is full (100 elements); data may be lost
MTHexapod.actuators ERROR: tel_actuators DDS read queue is full (100 elements); data may be lost
MTM2.position ERROR: tel_position DDS read queue is full (100 elements); data may be lost
MTDome.logevent_azMotion ERROR: evt_azMotion DDS read queue is full (100 elements); data may be lost
MTHexapod.logevent_heartbeat WARNING: evt_heartbeat DDS read queue is filling: 40 of 100 elements
MTM2.netMomentsTotal ERROR: tel_netMomentsTotal DDS read queue is full (100 elements); data may be lost
MTMount.logevent_target ERROR: evt_target DDS read queue is full (100 elements); data may be lost
MTM2.netForcesTotal ERROR: tel_netForcesTotal DDS read queue is full (100 elements); data may be lost
MTM1M3.outerLoopData ERROR: tel_outerLoopData DDS read queue is full (100 elements); data may be lost
```

```

MTMount.logevent_cameraCableWrapTarget ERROR: evt_cameraCableWrapTarget DDS
read queue is full (100 elements); data may be lost
MTRotator.ccwFollowingError ERROR: tel_ccwFollowingError DDS read queue is
full (100 elements); data may be lost
MTHexapod.logevent_heartbeat WARNING: evt_heartbeat DDS read queue is filling: 39 of 100 elements
MTM2.ilcData ERROR: tel_ilcData DDS read queue is full (100 elements); data
may be lost
MTRotator.logevent_target ERROR: evt_target DDS read queue is full (100 ele
ments); data may be lost
Gathering data - with Aberrations Accumulated - End time: 2022-06-21T01:57:36.
178
MTM1M3.inclinometerData ERROR: tel_inclinometerData DDS read queue is full
(100 elements); data may be lost
MTM2.forceBalance ERROR: tel_forceBalance DDS read queue is full (100 eleme
nts); data may be lost
MTM2.displacementSensors ERROR: tel_displacementSensors DDS read queue is f
ull (100 elements); data may be lost
MTM1M3.imsData ERROR: tel_imsData DDS read queue is full (100 elements); da
ta may be lost
MTM1M3.hardpointMonitorData ERROR: tel_hardpointMonitorData DDS read queue
is full (100 elements); data may be lost
MTM2.axialEncoderPositions ERROR: tel_axialEncoderPositions DDS read queue
is full (100 elements); data may be lost
MTM1M3.hardpointActuatorData ERROR: tel_hardpointActuatorData DDS read queu
e is full (100 elements); data may be lost
MTM1M3.forceActuatorData ERROR: tel_forceActuatorData DDS read queue is ful
l (100 elements); data may be lost
MTM1M3.accelerometerData ERROR: tel_accelerometerData DDS read queue is ful
l (100 elements); data may be lost
MTM1M3.logevent_forceActuatorWarning ERROR: evt_forceActuatorWarning DDS re
ad queue is full (100 elements); data may be lost
MTM1M3.logevent_appliedThermalForces ERROR: evt_appliedThermalForces DDS re
ad queue is full (100 elements); data may be lost
MTM1M3.logevent_appliedStaticForces ERROR: evt_appliedStaticForces DDS read
queue is full (100 elements); data may be lost
MTM1M3.logevent_appliedForces ERROR: evt_appliedForces DDS read queue is fu
ll (100 elements); data may be lost
MTM1M3.logevent_appliedElevationForces ERROR: evt_appliedElevationForces DD
S read queue is full (100 elements); data may be lost
MTM1M3.logevent_appliedCylinderForces ERROR: evt_appliedCylinderForces DDS
read queue is full (100 elements); data may be lost
MTM1M3.logevent_appliedBalanceForces ERROR: evt_appliedBalanceForces DDS re
ad queue is full (100 elements); data may be lost
MTM1M3.logevent_appliedAzimuthForces ERROR: evt_appliedAzimuthForces DDS re
ad queue is full (100 elements); data may be lost
MTM1M3.logevent_appliedActiveOpticForces ERROR: evt_appliedActiveOpticForc
es DDS read queue is full (100 elements); data may be lost
MTM1M3.logevent_appliedAberrationForces ERROR: evt_appliedAberrationForces
DDS read queue is full (100 elements); data may be lost

```

In [31]: `print(f"Gathering data - with Aberrations Accumulated - Start time: {t_start_wi
print(f"Gathering data - with Aberrations Accumulated - End time: {t_end_with_a`

Gathering data - with Aberrations Accumulated - Start time: 2022-06-21T01:57:3  
6.178  
Gathering data - with Aberrations Accumulated - End time: 2022-06-21T02:02:26.  
898

## Plot Optics vs Time

```
In [34]: # Query telemetry
df_aberr_acc = await get_data_from_efd(
    exec_info.loc,
    t_start_with_acc_aberration,
    t_end_with_acc_aberration)

MTHexapod.electrical WARNING: tel_electrical DDS read queue is filling: 11
of 100 elements
MTHexapod.electrical WARNING: tel_electrical DDS read queue is filling: 22
of 100 elements
MTHexapod.application WARNING: tel_application DDS read queue is filling: 1
1 of 100 elements
MTHexapod.actuators WARNING: tel_actuators DDS read queue is filling: 10 of
100 elements
MTHexapod.application WARNING: tel_application DDS read queue is filling: 2
3 of 100 elements
MTHexapod.actuators WARNING: tel_actuators DDS read queue is filling: 22 of
100 elements
MTM1M3.logevent_appliedBalanceForces ERROR: evt_appliedBalanceForces DDS re
ad queue is full (100 elements); data may be lost
MTM1M3.logevent_appliedAzimuthForces ERROR: evt_appliedAzimuthForces DDS re
ad queue is full (100 elements); data may be lost
MTM1M3.logevent_appliedActiveOpticForces ERROR: evt_appliedActiveOpticForce
s DDS read queue is full (100 elements); data may be lost
```

```
In [35]: fig, axs = plt.subplots(figsize=(10, 10), nrows=4, sharex=True)

axs[0].plot(df_aberr_acc["mount_el"].dropna(), "k", label="Mount Elevation")
axs[0].set_ylabel("Mount El\n[ndeg]")

axs[1].plot(df_aberr_acc["m1m3_z101"].dropna(), "C0o-", label="z")
axs[1].set_ylabel("M1M3 Forces\n[n--]")

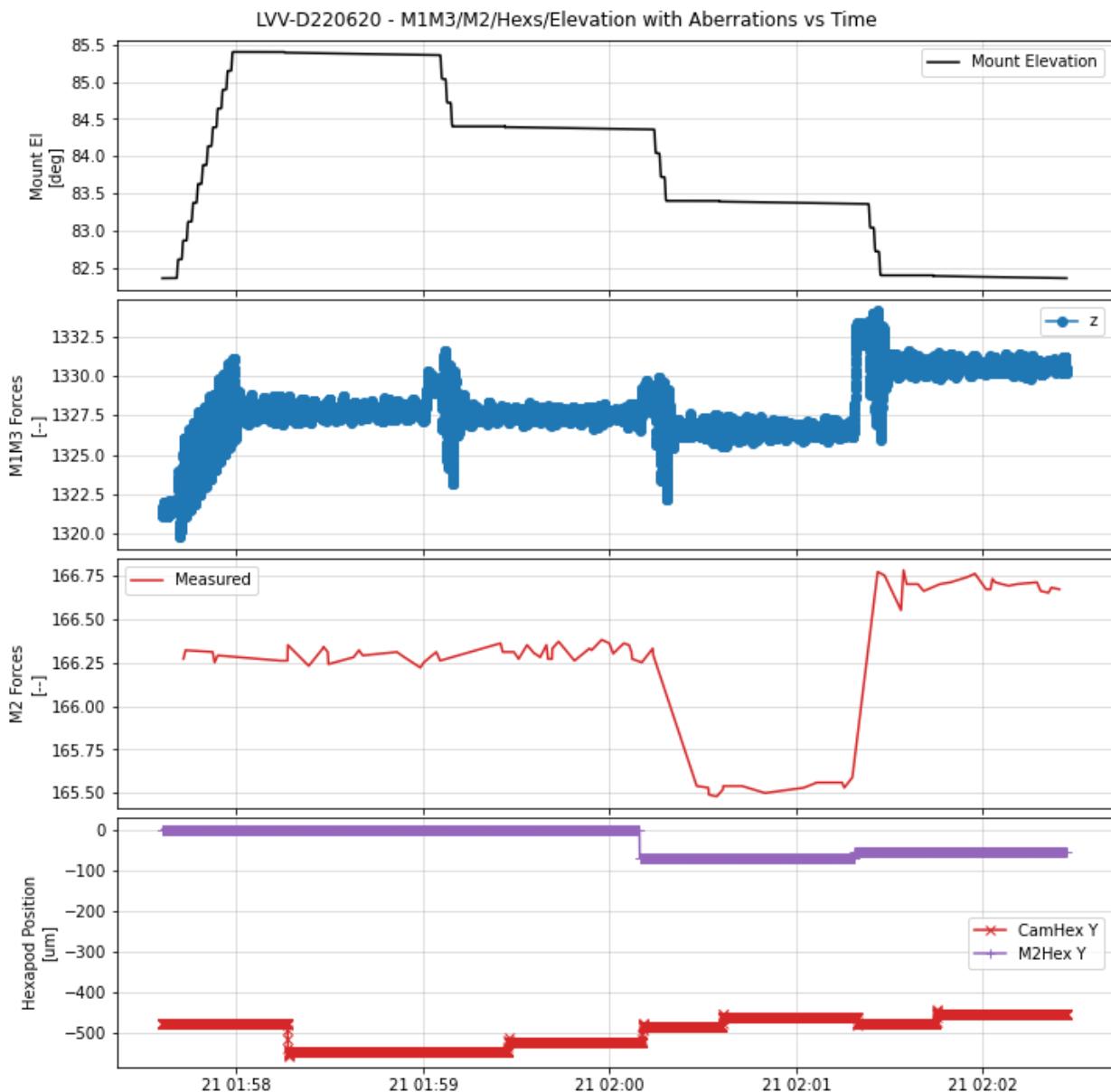
# axs[2].plot(df_aberr_acc["m2b1_applied"].dropna(), "C1^-", label="applied")
# axs[2].plot(df_aberr_acc["m2b1_gravLut"].dropna(), "C2v-", label="Gravity LUT")
axs[2].plot(df_aberr_acc["m2b1_measured"].dropna(), "C3-", label="Measured")
axs[2].set_ylabel("M2 Forces\n[n--]")

axs[3].plot(df_aberr_acc["camhex_y"].dropna(), "C3x-", label="CamHex Y")
axs[3].plot(df_aberr_acc["m2hex_y"].dropna(), "C4+-", label="M2Hex Y")
axs[3].set_ylabel("Hexapod Position\n[num]")

for ax in axs:
    ax.grid(":", alpha=0.5)
    ax.legend()

fig.suptitle(f"{test_execution} - M1M3/M2/Hexs/Elevation with Aberrations vs Ti
fig.tight_layout(h_pad=0.3)
fig.patch.set_facecolor('white')
```

```
fig.savefig(f"plots/{test_execution}_m1m3_m2_hexs_el_vs_time_with_aberr.png")
plt.show()
```



```
MTHexapod.electrical WARNING: tel_electrical DDS read queue is filling: 13
of 100 elements
MTHexapod.application WARNING: tel_application DDS read queue is filling: 1
3 of 100 elements
MTHexapod.actuators WARNING: tel_actuators DDS read queue is filling: 12 of
100 elements
MTM1M3.logevent_appliedAberrationForces ERROR: evt_appliedAberrationForces
DDS read queue is full (100 elements); data may be lost
```

In [101]: `print( mtcs.rem.mtaos.evt_m2Correction.get() )`

```
private_revCode: 82b91b70, private_sndStamp: 1655774118.8707237, private_rcvStamp: 1655774118.8718843, private_seqNum: 48, private_identity: MTAOS, private_origin: 7464, zForces: [0.38514262437820435, 0.2540520131587982, -0.21938371658325195, -0.8105347156524658, -1.2507991790771484, -1.3482741117477417, -1.039899230003357, -0.39875054359436035, 0.37002959847450256, 1.0108683109283447, 1.3195208311080933, 1.2246819734573364, 0.7883461713790894, 0.20059482753276825, -0.2723424434661865, -0.4066181480884552, -0.1480191946029663, 0.4318847954273224, 1.0891876220703125, 1.5436952114105225, 1.6020749807357788, 1.2067307233810425, 0.4426327645778656, -0.46327245235443115, -1.229457139968872, -1.628645658493042, -1.573676347732544, -1.1209369897842407, -0.4622495174407959, 0.12183976918458939, 0.8294423222541809, 0.6169194579124451, 0.2896759808063507, 0.013415729627013206, -0.09752146154642105, -0.05001416429877281, 0.05900082364678383, 0.10608203709125519, -0.003586529055610299, -0.276654988527298, -0.6017389297485352, -0.8155629634857178, -0.8130693435668945, -0.5930014252662659, -0.25997403264045715, 0.01868191920220852, 0.12641431391239166, 0.06887238472700119, -0.05493934825062752, -0.11535792052745819, -0.011132927611470222, 0.2658177316188812, 0.5998951196670532, 0.823270320892334, 0.8941072225570679, 0.8555020689964294, 0.8260058760643005, 0.6576071977615356, 0.2675730288028717, -0.2404181957244873, -0.6301775574684143, -0.7963577508926392, -0.8245127201080322, -0.8651843667030334, -0.9658037424087524, -1.0075269937515259, -0.8096762895584106, -0.3083992600440979, 0.34034231305122375, 0.8382107019424438, 1.0333651304244995, 0.9919871091842651], priority: 0
```

```
In [37]: print( mtcs.rem.mtaos.evt_m2Correction.get() )
await mtcs.rem.mtaos.cmd_resetCorrection.set_start()
print( mtcs.rem.mtaos.evt_m2Correction.get() )

w = np.zeros(19)
w[0] = 1

await mtcs.rem.mtaos.cmd_addAberration.set_start(wf=w)
print( mtcs.rem.mtaos.evt_m2Correction.get() )
```

In [ ]:

Compare against the corrections sent by MTAOS.

check the force and hexapod position differences between steps 10 and 12.

Compare against the corrections sent by MTAOS. They should match.

M1M3 and M2 not using LUT so when no aberrations are applied, all forces are 0.

To compare forces and hexapod positions, I will find the inPosition flag for the mount and will compare them 3 seconds after it reached position.

```
In [ ]: # Without aberrations  
t_start = "2022-06-14T16:24:47.387"
```

```
t_start = time.Time(t_start, format="isot", scale="utc")

t_end = "2022-06-14T16:31:25.569"
t_end = time.Time(t_end, format="isot", scale="utc")
```

```
In [ ]: # With aberrations 2022-06-14T16:34:15.195 2022-06-14T16:38:24.966
t_start_aberr = "2022-06-14T16:32:47.387"
t_start_aberr = time.Time(t_start_aberr, format="isot", scale="utc")

t_end_aberr = "2022-06-14T16:38:25.966"
t_end_aberr = time.Time(t_end_aberr, format="isot", scale="utc")
```

```
In [ ]: # Axis in Position in the slews.
```

```
In [ ]: inPosition_without = await client.select_time_series(
    'lsst.sal.MTMount.logevent_elevationInPosition',
    ['inPosition'],
    t_start,
    t_end
)
slews_without = inPosition_without[inPosition_without.inPosition == True]
```

```
In [ ]: startTracking_without = await client.select_time_series(
    'lsst.sal.MTMount.command_startTracking',
    ['*'],
    t_start,
    t_end
)
startTracking_without
```

```
In [ ]: inPosition_withaberr = await client.select_time_series(
    'lsst.sal.MTMount.logevent_elevationInPosition',
    ['inPosition'],
    t_start_aberr,
    t_end_aberr
)
slews_withaberr = inPosition_withaberr[inPosition_withaberr.inPosition == True]
```

```
In [ ]:
```

## M1 forces vs MTAOS corrections

```
In [ ]: line = []
interval = 0.5

for k in np.arange(len(startTracking_without)):

    # Query M1M3 forces 1 second before the slew command is sent

    df_m1m3_forces_withaberr = await client.select_time_series(
        "lsst.sal.MTM1M3.forceActuatorData",
        ["zForce101", "zForce10", "zForce1"],
        t_start_aberr,
        t_end_aberr
    )
```

```
# Query M1M3 forces 2 seconds before correction is issued
df_m1m3_forces_without = await client.select_time_series(
    "lsst.sal.MTM1M3.forceActuatorData",
    ["zForce101", "zForce10", "zForce1"] ,
    t_start,
    t_end
)

df_mount_el = await client.select_time_series(
    'lsst.sal.MTMount.elevation', 'actualPosition',
    Time(startTracking_withaberr.index[k])-TimeDelta(1.5, format='sec'),
    Time(startTracking_withaberr.index[k])-TimeDelta(0.5, format='sec')
)

# Build each line
line.append(
    {'time': Time(df_m1m3_applied_corrections.index[k]),
     'zForce101_Before': df_m1m3_forces_without.zForce101.mean(),
     'zForce101_After': df_m1m3_forces_withaberr.zForce101.mean(),
     'zForce10_Before': df_m1m3_forces_without.zForce10.mean(),
     'zForce10_After': df_m1m3_forces_withaberr.zForce10.mean(),
     'zForce1_Before': df_m1m3_forces_without.zForce1.mean(),
     'zForce1_After': df_m1m3_forces_withaberr.zForce1.mean(),

     'corr_zForce101':df_m1m3_applied_corrections.iloc[k].zForces101,
     'corr_zForce10':df_m1m3_applied_corrections.iloc[k].zForces10,
     'corr_zForce1':df_m1m3_applied_corrections.iloc[k].zForces1,

     'elevation' : df_mount_el.actualPosition.mean()
    }
)
)

m1m3_aos = pd.DataFrame(line)
```

In [ ]: # Without AO- Get the M1 zForce 101 position and elevation angle X seconds after

```
line = []
interval =10

for k in np.arange(len(slews_without)):
    inPos = Time(slews_without.index[k])
    print(inPos)
    t1 = inPos + TimeDelta(interval, format='sec')
    t2 = t1 + TimeDelta(1, format='sec')

    df_m1m3_101 = await client.select_time_series(
        "lsst.sal.MTM1M3.forceActuatorData",
        "zForce101",
        t1,
        t2,
    )

    df_mount_el = await client.select_time_series(
        'lsst.sal.MTMount.elevation', 'actualPosition',
        t1, t2)
```

```

        line.append(
            {'time': t1,
             'zForce101': df_m1m3_101.zForce101.mean(),
             'elevation' : df_mount_el.actualPosition.mean()
            }
        )

df_m1m3_without = pd.DataFrame(line)

```

```

In [ ]: # Without AO- Get the M1 zForce 101 position and elevation angle X seconds after
line = []

for k in np.arange(len(slews_withaberr)):
    inPos = Time(slews_withaberr.index[k])
    print(inPos)
    t1 = inPos + TimeDelta(interval, format='sec')
    t2 = t1 + TimeDelta(1, format='sec')

    df_m1m3_101 = await client.select_time_series(
        "lsst.sal.MTM1M3.forceActuatorData",
        "zForce101",
        t1,
        t2,
    )

    df_mount_el = await client.select_time_series(
        'lsst.sal.MTMount.elevation', 'actualPosition',
        t1, t2)

    line.append(
        {'time': t1,
         'zForce101': df_m1m3_101.zForce101.mean(),
         'elevation' : df_mount_el.actualPosition.mean()
        }
    )

df_m1m3_withaberr = pd.DataFrame(line)

```

```

In [ ]: m1m3_correction = await client.select_time_series(
    'lsst.sal.MTAOS.logevent_m1m3Correction',
    [f"zForces101"],
    t_start_aberr,
    t_end_aberr
)

```

```

In [ ]: # Print force differences between aberr and nonaberr slews vs MTAOS corrections
print("1 um of z4 (Focus)")
print(f"zForces101_diff \t Time --- \n"
      f"{df_m1m3_withaberr.iloc[0].zForce101-df_m1m3_without.iloc[0].zForce101:\n"
      f"zForces101_corr \t Time ----- MTAOS correction \n"
      f"{m1m3_correction.iloc[1].zForces101:0.5f} \t {m1m3_correction.index[1]}\n"

print("1 um of z5 (Astigmatism)")
print(f"zForces101_diff \t Time --- \n"
      f"{df_m1m3_withaberr.iloc[1].zForce101-df_m1m3_without.iloc[1].zForce101:\n"
      f"zForces101_corr \t Time ----- MTAOS correction \n"
      f"{m1m3_correction.iloc[3].zForces101:0.5f} \t {m1m3_correction.index[3]}")

```

```

print("1 um of z7 (y-Coma)")
print(f"zForces101_diff \t Time --- \n"
      f"{df_m1m3_withaberr.iloc[2].zForce101-df_m1m3_without.iloc[2].zForce101:0.5f} \t {m1m3_correction.index[2]}")
print(f"zForces101_corr \t Time ----- MTAOS correction \n"
      f"{m1m3_correction.iloc[5].zForces101:0.5f} \t {m1m3_correction.index[5]}")

print("1 um of z9 (Trefoil)")
print(f"zForces101_diff \t Time --- \n"
      f"{df_m1m3_withaberr.iloc[3].zForce101-df_m1m3_without.iloc[3].zForce101:0.5f} \t {m1m3_correction.index[3]}")
print(f"zForces101_corr \t Time ----- MTAOS correction \n"
      f"{m1m3_correction.iloc[7].zForces101:0.5f} \t {m1m3_correction.index[7]}")

```

```
In [ ]: m1m3_correction_applied = await client.select_time_series(
    'lsst.sal.MTM1M3.command_applyActiveOpticForces',
    [f"zForces{i}" for i in range(156)],
    t_start_aberr.utc,
    t_end_aberr.utc
)
```

```
In [ ]: fig, axs = plt.subplots(2,2, figsize=(16, 8), sharex=True)

axs[0,0].plot(df_m1m3_withaberr.iloc[0].zForce101-m1m3_correction.iloc[1].zForce101, "C0*", label="M1M3 Applied Force")
axs[0,0].plot(df_m1m3_without.iloc[0].zForce101, "C0*", label="M1M3 Without Force")

# axs[0,1].plot(m1m3_correction.iloc[3].dropna()-m1m3_correction_applied.iloc[3].dropna(), "C0o", label="M1M3 AOS Force")
# #axs[0,1].plot(m1m3_correction_applied.iloc[1].dropna(), "C0o", label="M1M3 AOS Force")

# axs[1,0].plot(m1m3_correction.iloc[5].dropna()-m1m3_correction_applied.iloc[5].dropna(), "C0o", label="M1M3 AOS Force")
# #axs[1,0].plot(m1m3_correction_applied.iloc[2].dropna(), "C0o", label="M1M3 AOS Force")

# axs[1,1].plot(m1m3_correction.iloc[7].dropna()-m1m3_correction_applied.iloc[7].dropna(), "C0o", label="M1M3 AOS Force")
# #axs[1,1].plot(m1m3_correction_applied.iloc[3].dropna(), "C0o", label="M1M3 AOS Force"

for ax in axs.flat:
    ax.grid(":", alpha=0.3)
    ax.legend()

fig.suptitle(f"{test_execution} - M1M3 AOS corrections - M1M3 Commanded Apply Force")
fig.tight_layout(h_pad=0.3)
fig.patch.set_facecolor('white')

fig.savefig(f"plots/{test_execution}_m1m3_forces_vs_aos.png")
plt.show()
```

## M2 forces vs MTAOS corrections

```
In [ ]: # M2 B1?
df_m2 = await client.select_time_series(
    "lsst.sal.MTM2.axialForce",
    fields=[],
    applied0",
    ],
    start=start,
    end=end,
)
```

```
In [ ]: m2_correction = await client.select_time_series(
    'lsst.sal.MTAOS.logevent_m2Correction',
    [f"zForces{i}" for i in range(72)],
    t_start_aberr,
    t_end_aberr
)
# Change column names to match that of commanded forces, aka axial.
m2_correction.columns = m2_correction.columns.str.replace("zForces", "axial")
```

```
In [ ]: m2_correction_applied = await client.select_time_series(
    'lsst.sal.MTM2.command_applyForces',
    [f"axial{i}" for i in range(72)],
    t_start_aberr,
    t_end_aberr)
```

```
In [ ]: fig, axs = plt.subplots(2,2, figsize=(16, 8), sharex=True)

axs[0,0].plot(m2_correction.iloc[1]-m2_correction_applied.iloc[1], "C0*", label="#")
#axs[0,0].plot(mlm3_correction_applied.iloc[0].dropna(), "C0o", label="M1M3 Applied")

axs[0,1].plot(m2_correction.iloc[3]-m2_correction_applied.iloc[3], "C0o", label="#")
#axs[0,1].plot(mlm3_correction_applied.iloc[1].dropna(), "C0o", label="M1M3 Applied")

axs[1,0].plot(m2_correction.iloc[5]-m2_correction_applied.iloc[5], "C1^-", label="#")
#axs[1,0].plot(mlm3_correction_applied.iloc[2].dropna(), "C0o", label="M1M3 Applied")

axs[1,1].plot(m2_correction.iloc[7]-m2_correction_applied.iloc[7], "C3x-", label="#")
#axs[1,1].plot(mlm3_correction_applied.iloc[3].dropna(), "C0o", label="M1M3 Applied"

for ax in axs.flat:
    ax.grid(":", alpha=0.3)
    ax.legend()

fig.suptitle(f"{test_execution} - M2 AOS corrections - M2 Commanded Apply Axial")
fig.tight_layout(h_pad=0.3)
fig.patch.set_facecolor('white')

fig.savefig(f"plots/{test_execution}_m2_with_aberr.png")
plt.show()
```

## CamHex vs MTAOS corrections

```
In [ ]: # Without AO- Get the CamHex position x,y,z,u,v 10 second after the mount reaches alignment

line = []
interval = 10

for k in np.arange(len(slews_without)):
    inPos = Time(slews_without.index[k])
    print(inPos)
    t1 = inPos + TimeDelta(interval, format='sec')
    t2 = t1 + TimeDelta(1, format='sec')

    df_camhex = await client.select_time_series(
        "lsst.sal.MTHexapod.application",
        ["position0", "position1", "position2", "position3", "position4", "position5"],
        t1,
        t2,
```

```

        index=2
    )

    df_mount_el = await client.select_time_series(
        'lsst.sal.MTMount.elevation', 'actualPosition',
        t1, t2)

    line.append(
        {'time': t1,
         'x': df_camhex.position0.mean(),
         'y': df_camhex.position1.mean(),
         'z': df_camhex.position2.mean(),
         'u': df_camhex.position3.mean(),
         'v': df_camhex.position4.mean(),
         'w': df_camhex.position5.mean(),
         'elevation' : df_mount_el.actualPosition.mean()
        })
    )

df_camhex_without = pd.DataFrame(line)

```

In [ ]: *# With Aberrations- Get the CamHex position x,y,z,u,v 5 seconds after the mount*

```

line = []

for k in np.arange(len(slews_withaberr)):
    inPos = Time(slews_withaberr.index[k])
    print(inPos)
    t1 = inPos + TimeDelta(interval, format='sec')
    t2 = t1 + TimeDelta(1, format='sec')

    df_camhex = await client.select_time_series(
        "lsst.sal.MTHexapod.application",
        ["position0", "position1", "position2", "position3", "position4", "posi
        t1,
        t2,
        index=2
    )

    df_mount_el = await client.select_time_series(
        'lsst.sal.MTMount.elevation', 'actualPosition',
        t1, t2)

    line.append(
        {'time': t1,
         'x': df_camhex.position0.mean(),
         'y': df_camhex.position1.mean(),
         'z': df_camhex.position2.mean(),
         'u': df_camhex.position3.mean(),
         'v': df_camhex.position4.mean(),
         'w': df_camhex.position5.mean(),
         'elevation' : df_mount_el.actualPosition.mean()
        })
    )

df_camhex_withaberr = pd.DataFrame(line)

```

In [ ]: *# Get the MTAOS corrections*

```
cam_hexapod_correction_applied_xyz = await client.select_time_series(
```

```
'lsst.sal.MTHexapod.logevent_uncompensatedPosition',
["x", "y", "z", "MTHexapodID"],
t_start_aberr,
t_end_aberr,
index=1
)

cam_hexapod_correction_applied_uv = await client.select_time_series(
    'lsst.sal.MTHexapod.logevent_uncompensatedPosition',
    ["u", "v", "MTHexapodID"],
    t_start_aberr,
    t_end_aberr,
    index=1
)
```

In [ ]:

```
cam_hexapod_correction_command_xyz = await client.select_time_series(
    'lsst.sal.MTHexapod.command_move',
    ["x", "y", "z", "MTHexapodID"],
    t_start_aberr,
    t_end_aberr,
    index=1
)

cam_hexapod_correction_command_uv = await client.select_time_series(
    'lsst.sal.MTHexapod.command_move',
    ["u", "v", "MTHexapodID"],
    t_start_aberr,
    t_end_aberr,
    index=1
)
```

In [ ]:

```
# Print camhex position differences vs MTAOS corrections for each type of aberration
print("1 um of z4 (Focus)")
print(f"x_diff      \t y_diff      \t z_diff      \t Time \n"
      f"{df_camhex_withaberr.iloc[0].x-df_camhex_without.iloc[0].x:0.5f} \t {df_camhex_withaberr.iloc[0].y-df_camhex_without.iloc[0].y:0.5f} \t {df_camhex_withaberr.iloc[0].z-df_camhex_without.iloc[0].z:0.5f} \t {cam_hexapod_correction_applied_xyz.iloc[0].Time} \n"
      f"x_corr      \t y_corr      \t z_corr      \t Time ---- MTAOS correction \n"
      f"{cam_hexapod_correction_applied_xyz.iloc[0].x:0.5f} \t {cam_hexapod_correction_applied_xyz.iloc[0].y:0.5f} \t {cam_hexapod_correction_applied_xyz.iloc[0].z:0.5f} \t {cam_hexapod_correction_applied_xyz.index[0]} \n")

print("1 um of z5 (Astigmatism)")
print(f"x_diff      \t y_diff      \t z_diff      \t Time \n"
      f"{df_camhex_withaberr.iloc[1].x-df_camhex_without.iloc[1].x:0.5f} \t {df_camhex_withaberr.iloc[1].y-df_camhex_without.iloc[1].y:0.5f} \t {df_camhex_withaberr.iloc[1].z-df_camhex_without.iloc[1].z:0.5f} \t {cam_hexapod_correction_applied_xyz.iloc[1].Time} \n"
      f"x_corr      \t y_corr      \t z_corr      \t Time ---- MTAOS correction \n"
      f"{cam_hexapod_correction_applied_xyz.iloc[1].x:0.5f} \t {cam_hexapod_correction_applied_xyz.iloc[1].y:0.5f} \t {cam_hexapod_correction_applied_xyz.iloc[1].z:0.5f} \t {cam_hexapod_correction_applied_xyz.index[1]} \n")

print("1 um of z7 (y-Coma)")
print(f"x_diff      \t y_diff      \t z_diff      \t Time \n"
      f"{df_camhex_withaberr.iloc[2].x-df_camhex_without.iloc[2].x:0.5f} \t {df_camhex_withaberr.iloc[2].y-df_camhex_without.iloc[2].y:0.5f} \t {df_camhex_withaberr.iloc[2].z-df_camhex_without.iloc[2].z:0.5f} \t {cam_hexapod_correction_applied_xyz.iloc[2].Time} \n"
      f"x_corr      \t y_corr      \t z_corr      \t Time ---- MTAOS correction \n"
      f"{cam_hexapod_correction_applied_xyz.iloc[2].x:0.5f} \t {cam_hexapod_correction_applied_xyz.iloc[2].y:0.5f} \t {cam_hexapod_correction_applied_xyz.iloc[2].z:0.5f} \t {cam_hexapod_correction_applied_xyz.index[2]} \n")

print("1 um of z9 (Trefoil)")
print(f"x_diff      \t y_diff      \t z_diff      \t Time \n"
      f"{df_camhex_withaberr.iloc[3].x-df_camhex_without.iloc[3].x:0.5f} \t {df_camhex_withaberr.iloc[3].y-df_camhex_without.iloc[3].y:0.5f} \t {df_camhex_withaberr.iloc[3].z-df_camhex_without.iloc[3].z:0.5f} \t {cam_hexapod_correction_applied_xyz.iloc[3].Time} \n"
      f"x_corr      \t y_corr      \t z_corr      \t Time ---- MTAOS correction \n"
      f"{cam_hexapod_correction_applied_xyz.iloc[3].x:0.5f} \t {cam_hexapod_correction_applied_xyz.iloc[3].y:0.5f} \t {cam_hexapod_correction_applied_xyz.iloc[3].z:0.5f} \t {cam_hexapod_correction_applied_xyz.index[3]} \n")
```

```
f" {df_camhex_withaberr.iloc[3].z-df_camhex_without.iloc[3].z:0.5f} \t {c
f"x_corr    \t y_corr    \t z_corr    \t Time ---- MTAOS correction \n"
f"{cam_hexapod_correction_applied_xyz.iloc[6].x:0.5f} \t {cam_hexapod_cor
f"{cam_hexapod_correction_applied_xyz.index[6]} \n")
```

In [ ]: *# It's difficult to compare because MTAOS and lsst.sal.MTHexapod.logevent\_uncompensatedPosition*  
*cam\_hexapod\_correction\_command\_xyz*  
*cam\_hexapod\_correction\_applied\_xyz*

## M2Hex vs MTAOS corrections

In [ ]: `m2_hexapod_correction_computed_xyz = await client.select_time_series(
 'lsst.sal.MTAOS.logevent_m2HexapodCorrection',
 ["x", "y", "z"],
 start.utc,
 end.utc
)

m2_hexapod_correction_computed_uv = await client.select_time_series(
 'lsst.sal.MTAOS.logevent_m2HexapodCorrection',
 ["u", "v"],
 start.utc,
 end.utc
)`

In [ ]: `m2_hexapod_correction_applied_xyz = await client.select_time_series(
 'lsst.sal.MTHexapod.logevent_uncompensatedPosition',
 ["x", "y", "z", "MTHexapodID"],
 start.utc,
 end.utc,
 index=2
)

m2_hexapod_correction_applied_uv = await client.select_time_series(
 'lsst.sal.MTHexapod.logevent_uncompensatedPosition',
 ["u", "v", "MTHexapodID"],
 start.utc,
 end.utc,
 index=2
)`

In [ ]: `m2_hexapod_correction_command_xyz = await client.select_time_series(
 'lsst.sal.MTHexapod.command_move',
 ["x", "y", "z", "MTHexapodID"],
 start.utc,
 end.utc,
 index=2
)

m2_hexapod_correction_command_uv = await client.select_time_series(
 'lsst.sal.MTHexapod.command_move',
 ["u", "v", "MTHexapodID"],
 start.utc,
 end.utc,
 index=2
)`

## Wrap up

lower m1m3, put hardware to OFFLINE put all simulators to STANDBY done.

```
In [ ]: # Put the telescope back to the original position
# Specially if running at TTS
await mtcs.point_azel(az=0, el=80)

In [ ]: await mtcs.lower_m1m3()

In [ ]: await mtcs.set_state(state=salobj.State.STANDBY, components=["mtm1m3"])

In [ ]: await mtcs.set_state(state=salobj.State.STANDBY, components=["mtaos"])

In [ ]: await mtcs.set_state(state=salobj.State.STANDBY, components=["mtm2"])

In [ ]: await mtcs.set_state(state=salobj.State.STANDBY, components=["mthexapod_1"])

In [ ]: await mtcs.set_state(state=salobj.State.STANDBY, components=["mthexapod_2"])

In [ ]: if exec_info.loc == "summit":
        await mtcs.standby()

    else:
        # Bring the system back to the original state
        await mtcs.set_state(
            state=salobj.State.ENABLED,
            components=[
                "mtm1m3",
                "mtm2",
                "mthexapod_1",
                "mthexapod_2",
                "mtaos",
            ],
            overrides={
                "mtm1m3": "Default"
            }
        )

In [ ]:
```