

LVV-T2290

March 11, 2022

1 Slew, Track and Image taking with ComCam

This notebook is used for the level 3 integration tests from test plan LVV-P81 (<https://jira.lsstcorp.org/secure/Tests.jspa#/testPlan/LVV-P81>) as part of test cycle LVV-C176 (<https://jira.lsstcorp.org/secure/Tests.jspa#/testCycle/LVV-C176>). The following tests are currently run as part of this notebook:

- LVV-T2290 (<https://jira.lsstcorp.org/secure/Tests.jspa#/testCase/LVV-T2290>)

Execution steps are separated by horizontal lines. Upon completion, save the notebook and its output as a pdf file to be attached to the test execution in JIRA.

Last executed by E. Dennihy 20210928

Run the setup.ipynb notebook to bring all components up and in their enabled position. Check Chronograph.

Bring ComCom online and tranistion it to EnabledState. Check Chronograph.

```
[1]: %load_ext autoreload
      %autoreload 2
```

```
[2]: import rubin_jupyter_utils.lab.notebook as nb
      nb.utils.get_node()
```

```
/tmp/ipykernel_37157/1665379685.py:2: DeprecationWarning: Call to deprecated
function (or staticmethod) get_node. (Please use lsst.rsp.get_node())
      nb.utils.get_node()
```

```
[2]: 'yagan06'
```

```
[3]: import os
      import sys
      import asyncio
      import logging

      import pandas as pd
      import numpy as np
```

```

from matplotlib import pyplot as plt

from lsst.ts import salobj
from lsst.ts.observatory.control.maintel import MTCS, ComCam
from lsst.ts.observatory.control import RotType

```

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

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

```
[6]: domain = salobj.Domain()
```

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

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```
[8]: await mtcs.start_task
```

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```
[8]: [None, None, None, None, None, None, None, None, None]
```

```
[9]: comcam = ComCam(domain=domain, log=log)
```

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```

```
[10]: comcam.set_rem_loglevel(40)
```

```
[11]: await comcam.start_task
```

```
[11]: [None, None, None]
```

```
[12]: await comcam.enable()
```

```
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```

Find four targets separated by 5° in azimuth and elevation in a square pattern around $az = 120^\circ$ and $el = 60^\circ$ and rotator angle at PhysicalSky and 1.8° .

At this position, the rotator stays within a couple of degrees of its initial position. This is because the CCW is not running (MTmount in simulation mode).

```
target_1 -> az = 117.5°, el = 57.5°
target_2 -> az = 122.5°, el = 57.5°
target_3 -> az = 122.5°, el = 62.5°
target_4 -> az = 117.5°, el = 62.5°
```

```
[13]: target_1 = await mtcs.find_target(az=117.5, el=57.5, mag_limit=8)
      target_2 = await mtcs.find_target(az=122.5, el=57.5, mag_limit=8)
      target_3 = await mtcs.find_target(az=122.5, el=62.5, mag_limit=8)
      target_4 = await mtcs.find_target(az=117.5, el=62.5, mag_limit=8)

      print(f"Target 1: {target_1}"
            f"Target 2: {target_2}"
            f"Target 3: {target_3}"
            f"Target 4: {target_4}")
```

Target 1: HD 218492Target 2: HD 218308Target 3: HD 215072Target 4: HD 214942

Slew to target 1:

```
[14]: await mtcs.slew_object(target_1, rot_type=RotType.PhysicalSky, rot=1.9)
```

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```

[illegible]

```
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```

Once on target_1 and tracking, take an image with ComCam

```
[15]: exp1 = await comcam.take_object(15)
      print(f"Target 1 exposure: {exp1}")
```

```
<IPython.core.display.HTML object>
<IPython.core.display.HTML object>
<IPython.core.display.HTML object>
Target 1 exposure: [2022031100001]
```

Slew to target_2:

```
[16]: await mtcs.slew_object(target_2, rot_type=RotType.PhysicalSky, rot=1.9)
```

```
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```


Once on target_2 and tracking, take an image with ComCam

```
[17]: exp2 = await comcam.take_object(15)
      print(f"Target 1 exposure: {exp2}")
```

<IPython.core.display.HTML object>

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<IPython.core.display.HTML object>

Target 1 exposure: [2022031100002]

Slew to target_3

```
[18]: await mtcs.slew_object(target_3, rot_type=RotType.PhysicalSky, rot=1.9)
```

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[illegible]

Once on target_3 and tracking, take an image with ComCam

```
[19]: exp3 = await comcam.take_object(15)
      print(f"Target 1 exposure: {exp3}")
```

```
<IPython.core.display.HTML object>
<IPython.core.display.HTML object>
<IPython.core.display.HTML object>
Target 1 exposure: [2022031100003]
```

Slew to target 4

```
[20]: await mtcs.slew_object(target_4, rot_type=RotType.PhysicalSky, rot=1.9)
```

[illegible]

[illegible]

Once on target_4 and tracking, take an image with ComCam.

```
[21]: exp4 = await comcam.take_object(15)
print(f"Target 1 exposure: {exp4}")
```

```
<IPython.core.display.HTML object>
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<IPython.core.display.HTML object>
```

Target 1 exposure: [2022031100004]

Stop tracking to prevent hitting the Rotator soft limit.

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

<IPython.core.display.HTML object>

Use ComCam recent images CCS to ensure that the images were taken (<http://ccs.lsst.org/RecentImages/comcam.html>).

Query the butler to verify that the images are there and check the metadata. This step must be verified using a separate notebook.

```
[23]: import lsst.daf.butler as dafButler
```

```
[24]: butler = dafButler.Butler("/repo/LSSTComCam/")
```

```
[25]: data_id = {'instrument': 'LSSTComCam', 'detector': 0, 'exposure': exp1}
```

```
[26]: raw = butler.get('raw', dataId=data_id, collections=["LSSTComCam/raw/all"])
      print(raw.getMetadata())
```

<IPython.core.display.HTML object>

```
-----
LookupError                                Traceback (most recent call last)
Input In [26], in <cell line: 1>()
----> 1 raw =
      ↳ butler.get('raw', dataId=data_id, collections=["LSSTComCam/raw/all"])
        2 print(raw.getMetadata())

File /opt/lsst/software/stack/stack/miniconda3-py38_4.9.2-2.0.0/Linux64/
↳ daf_butler/gfea7036203+c272d82c7c/python/lsst/daf/butler/_butler.py:1335, in
↳ Butler.get(self, datasetRefOrType, dataId, parameters, collections, **kwargs)
   1286 """Retrieve a stored dataset.
   1287
   1288 Parameters
   (...)
   1332 ``exposure`` is a temporal dimension.
   1333 """
   1334 log.debug("Butler get: %s, dataId=%s, parameters=%s", datasetRefOrType,
↳ dataId, parameters)
-> 1335 ref =
      ↳ self._findDatasetRef(datasetRefOrType, dataId, collections=collections, **kwargs)
```

```

1336 return self.getDirect(ref, parameters=parameters)

File /opt/lsst/software/stack/stack/miniconda3-py38_4.9.2-2.0.0/Linux64/
↳ daf_butler/gfea7036203+c272d82c7c/python/lsst/daf/butler/_butler.py:1051, in
↳ Butler._findDatasetRef(self, datasetRefOrType, dataId, collections,
↳ allowUnresolved, **kwargs)
    1049         if collections is None:
    1050             collections = self.registry.defaults.collections
-> 1051         raise LookupError(
    1052             f"Dataset {datasetType.name} with data ID {dataId} "
    1053             f"could not be found in collections {collections}."
    1054         )
    1055 if idNumber is not None and idNumber != ref.id:
    1056     if collections is None:

LookupError: Dataset raw with data ID {instrument: 'LSSTComCam', detector: 0,
↳ exposure: array([2022031100001])} could not be found in collections
↳ ['LSSTComCam/raw/all'].

```

Wrap Up and Shut Down

This cell is not currently included as part of the test execution, but included here as needed to shutdown the systems

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

```
[ ]: await mtcs.lower_m1m3()
```

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

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

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

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

```
[ ]: await mtcs.standby()
```

```
[ ]: await comcam.standby()
```