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In [121... import matplotlib.pyplot as plt
from openpyxl import load_workbook
from openpyxl.utils import get_column_letter

workbook = load_workbook(filename="injector_lattice_20230303-2.xlsx", data_c
worksheet = workbook["lattice"]
```

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In [120... cell_value = worksheet["A1"].value
print(cell_value)
```

regend :

```
In [102... row_start = 12

res = {}
key_names = list(map(lambda c: c.value, worksheet["12"]))

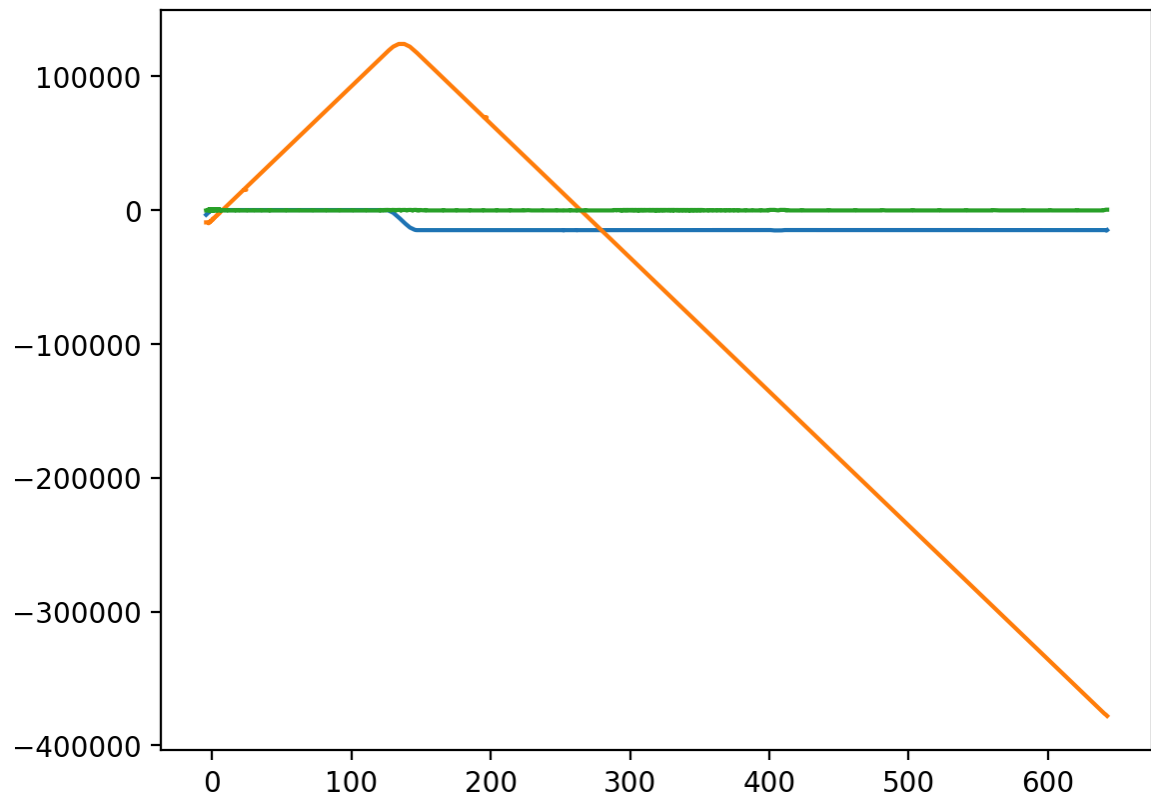
for i, key in enumerate(key_names):
    res[key] = list(map(lambda c: c.value, worksheet[get_column_letter(i + 1

#res = np.array(list(map(lambda c: c.value, sheet["H"])), dtype='str')[row_s
```

```
In [103... res.keys()
```

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Out[103... dict_keys(['beam_source', 'segment_name', 'inst_type', 'd/s', None, 'point_
name', 'element_name', 'element_type', 's [m]', 'xd [mm]', 'yd [mm]', 'zd
[mm]', 'xs [mm]', 'ys [mm]', 'zs [mm]', "zs' [mm]", 'Δx [mm]', 'Δy [mm]',
'Δz [mm]', "Δz' [mm]", "x' [rad]", "y' [rad]", "z' [rad]", 'drift [mm]', 'e
lement_length [mm]', 'center-to-center_length [mm]', 'effective_length
[m]', 'bore_dia [mm]', 'aperture [mm]', 'Remarks'])
```

```
In [119... # reference (design) lattice
plt.plot(res['s [m]'], res['xd [mm]'])
plt.plot(res['s [m]'], res['yd [mm]'])
plt.plot(res['s [m]'], res['zd [mm]'])
plt.show()
```



```
In [118... plt.plot(res['s [m]'], res['Δx [mm]'], label="horizontal alignment error")
plt.plot(res['s [m]'], res['Δz [mm]'], label="vertical alignment error")
plt.legend()

#plt.plot(res['s [m]'], res['Δy [mm]'])
```

```
Out[118... <matplotlib.legend.Legend at 0x1691956a0>
```

