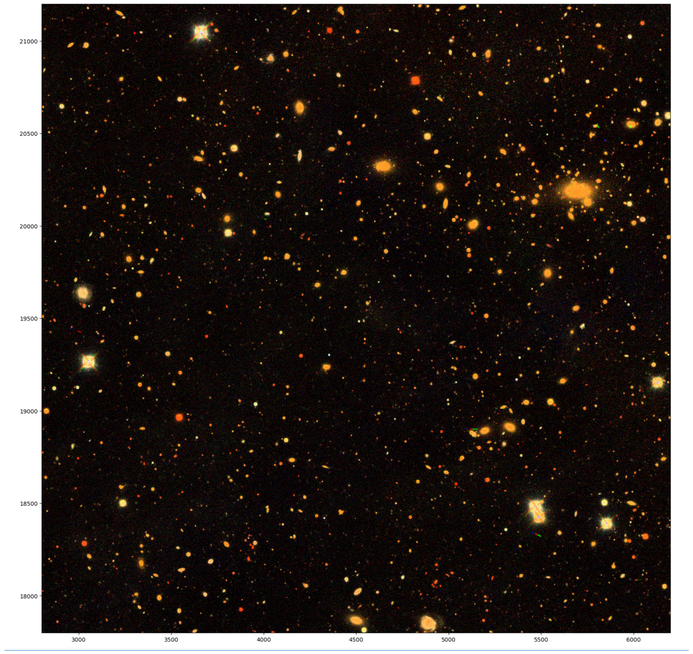
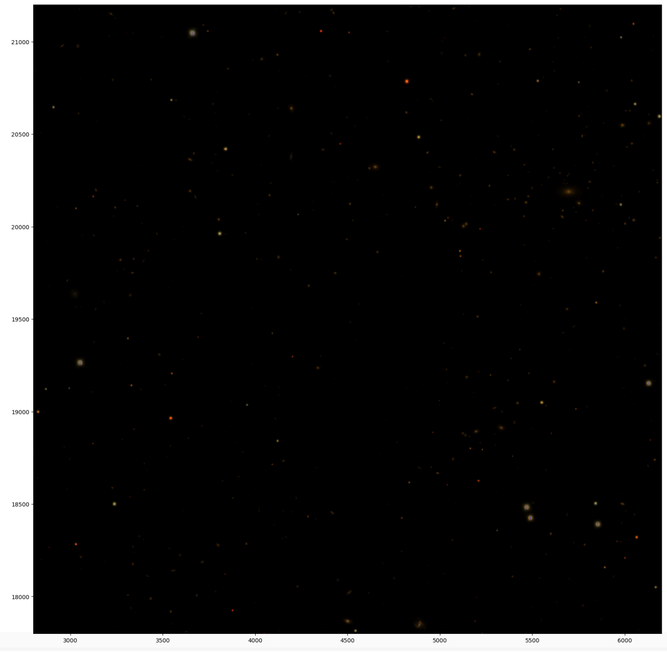
First look at ComCam data

Narei Lorenzo Martinez - 25/03/2025

stretch=1, Q=1



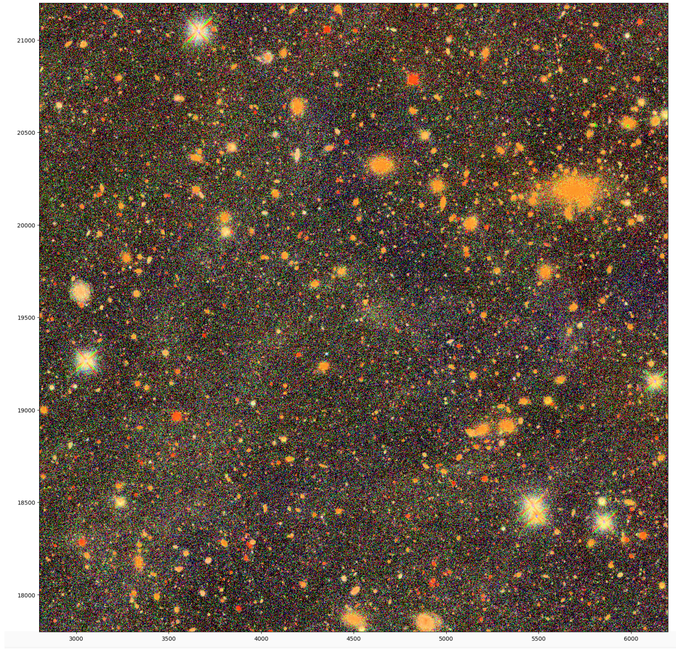
stretch=45, Q=12

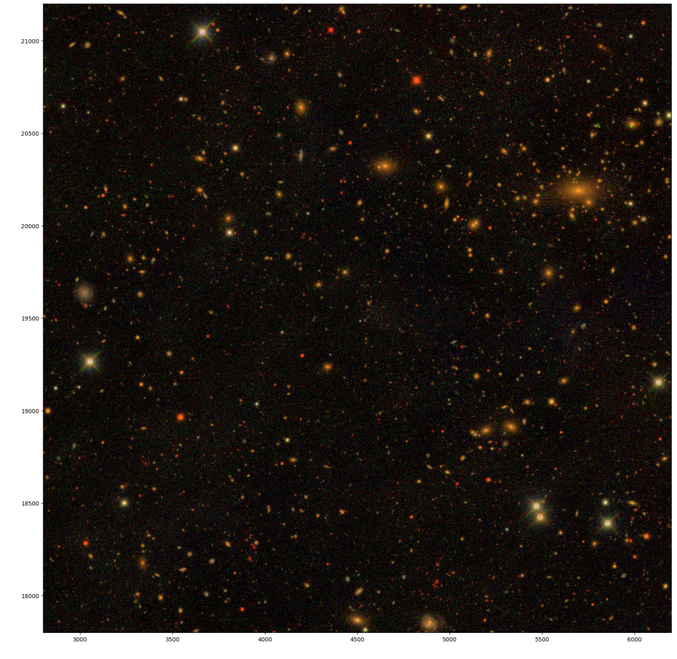


DeepCoadd
tract : 10463
patch : 61

LSSTComCam/runs/DRP/DP1/w_2025_03/DM-48478

Jira: https://rubinobs.atlassian.net/browse/DM-48478





LSSTComCam/runs/DRP/DP1/w_2025_10/DM-49359

Jira: https://rubinobs.atlassian.net/browse/DM-49359

from https://dp0-2.lsst.io/data-products-dp0-2/index.html

Coadd images are divided into **“tracts”** (a spherical convex polygon) and tracts are divided into **“patches”** (a quadrilateral sub-region, with a size in pixels chosen to fit easily into memory on desktop computers, about the same size as a “calexp”).

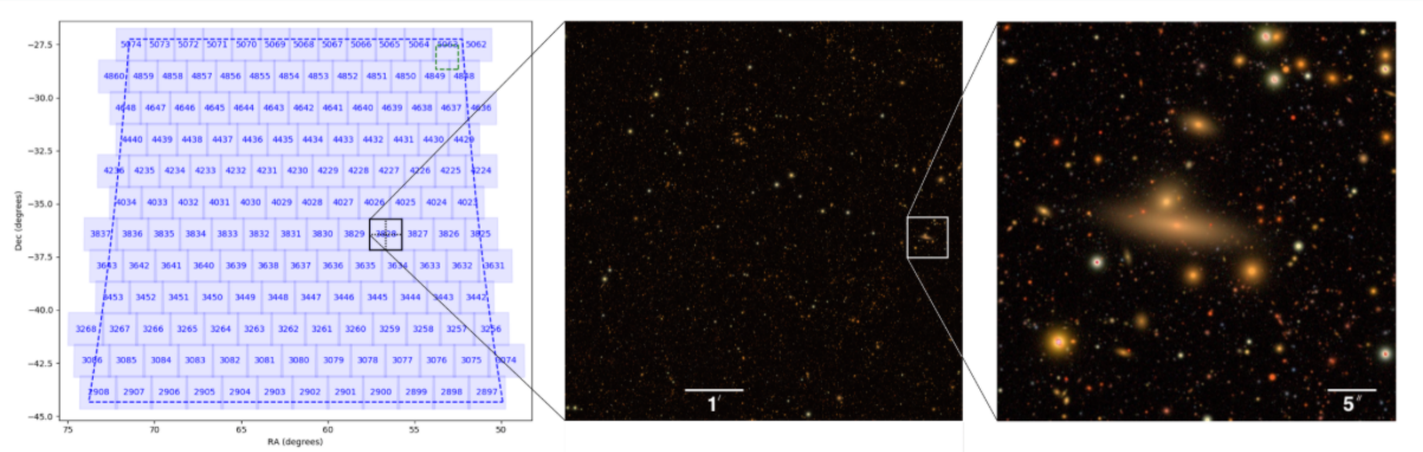
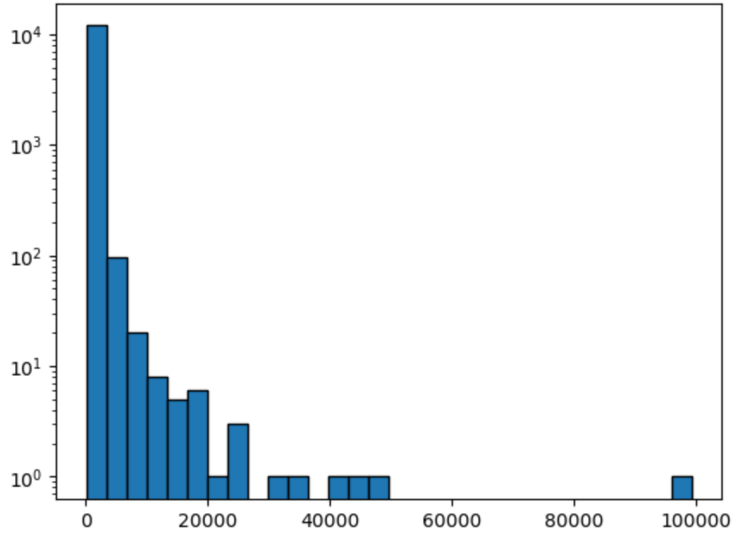
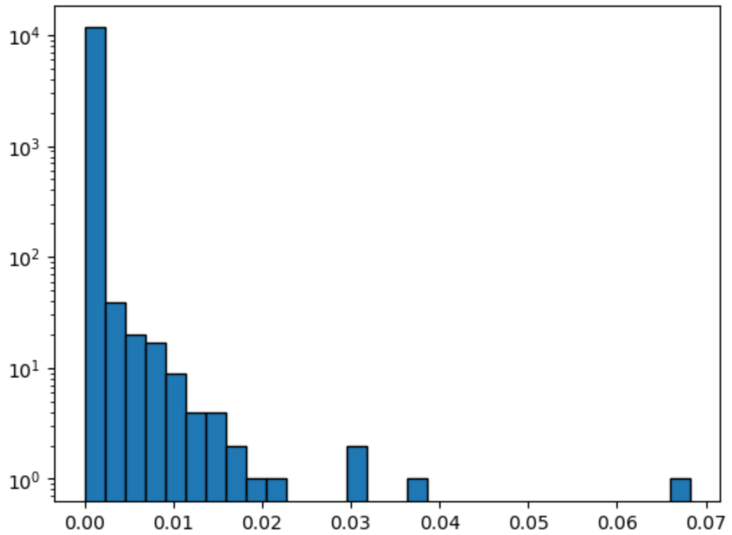


Figure 15 from The LSST DESC DC2 Simulated Sky Survey, showing the simulated WFD region divided into tracts. The center image is one tract quadrant, and the right image one hundredth the area of the tract quadrant. Patches are larger than the right image, as described in the DESC’s paper: *“each tract is composed of 7 × 7 patches, and each patch is 4,100 × 4,100 pixels with a pixel scale of 0.2 arcsec”*.

Name: footprintArea, Length: 12090, dtype: int32

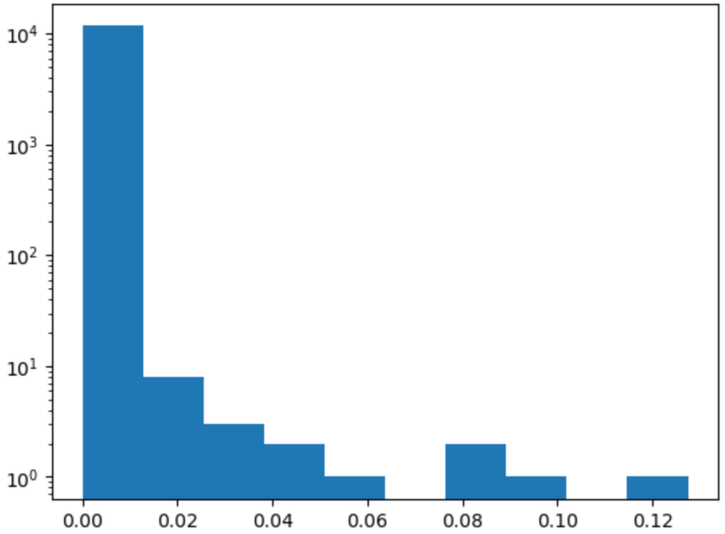


Name: coord_decErr, Length: 12090, dtype: float32

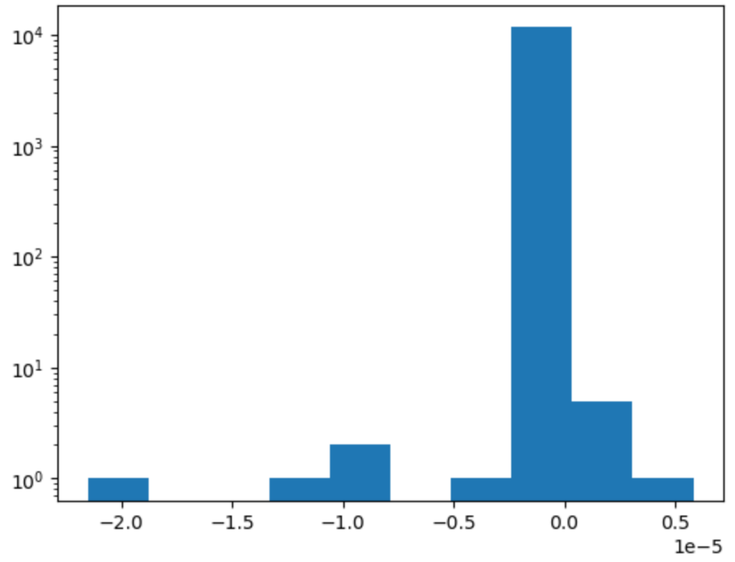


12089 0.000031

Name: coord_raErr, Length: 12090, dtype: float32

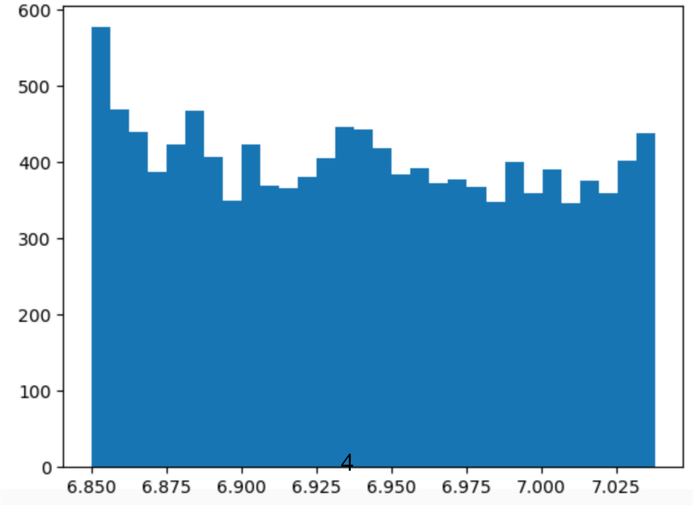


Name: coord_ra_dec_Cov, Length: 12090, dtype: float32



Name: coord_dec, Length: 12090, dtype: float64

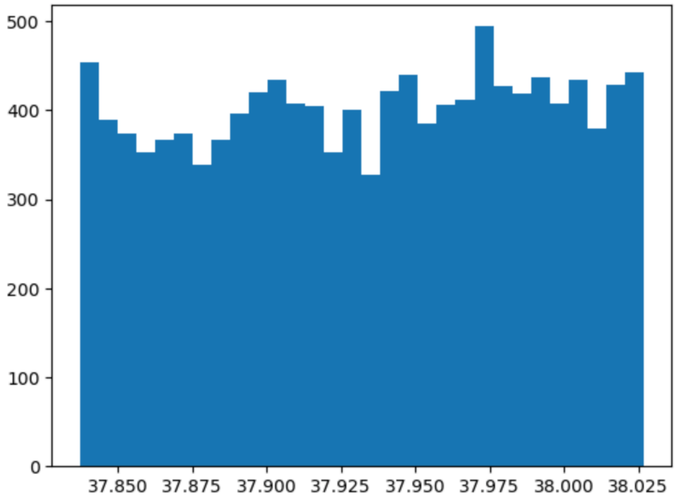
```
(array([577., 470., 439., 388., 423., 467., 407., 350., 424., 370., 366.,
        380., 406., 446., 443., 418., 384., 392., 373., 378., 367., 348.,
        401., 360., 391., 346., 376., 360., 402., 438.]),
 array([6.84981818, 6.85609034, 6.86236249, 6.86863464, 6.87490679,
        6.88117894, 6.88745109, 6.89372325, 6.8999954 , 6.90626755,
        6.9125397 , 6.91881185, 6.92508401, 6.93135616, 6.93762831,
        6.94390046, 6.95017261, 6.95644476, 6.96271692, 6.96898907,
        6.97526122, 6.98153337, 6.98780552, 6.99407768, 7.00034983,
        7.00662198, 7.01289413, 7.01916628, 7.02543843, 7.03171059,
        7.03798274]),
 <BarContainer object of 30 artists>)
```

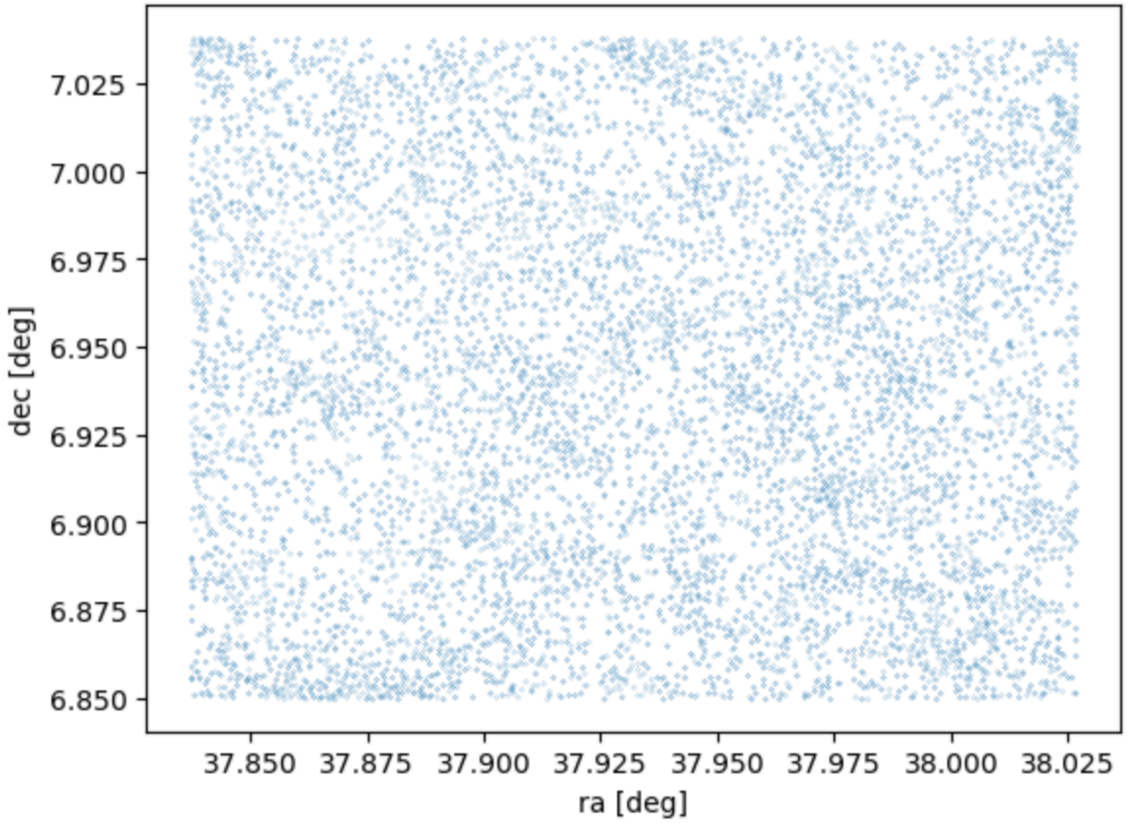


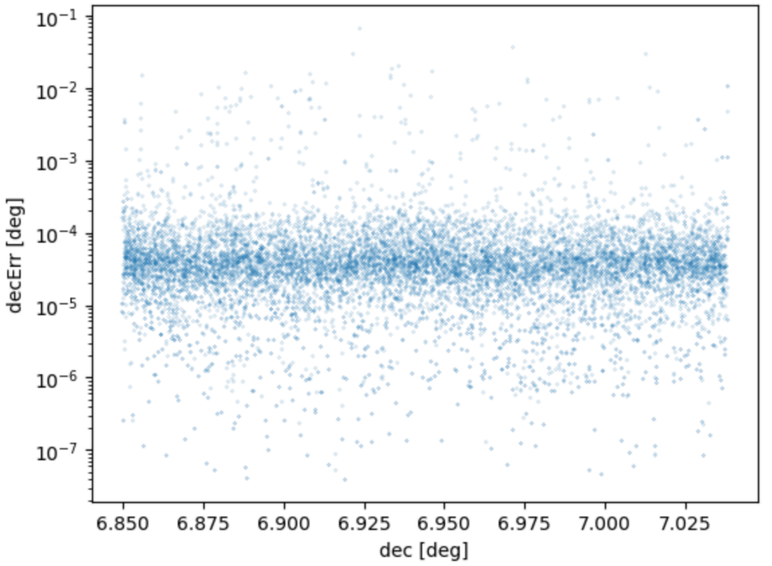
[ ]:

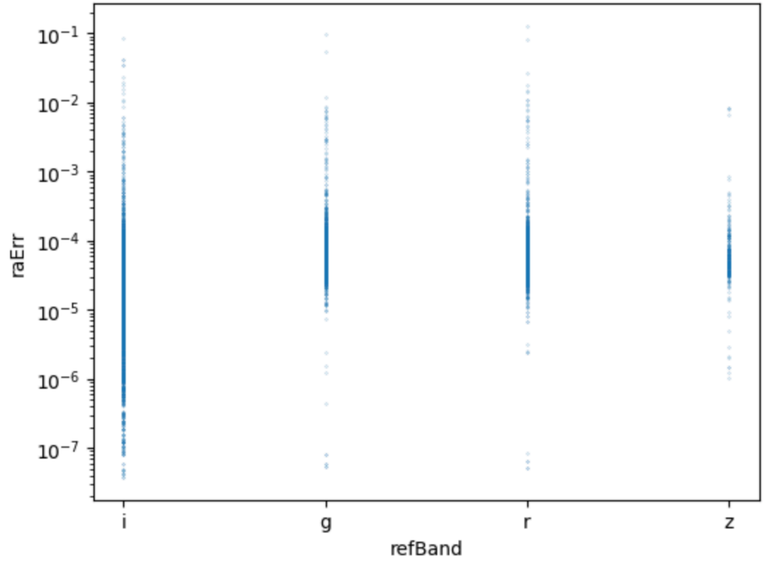
Name: coord_ra, Length: 12090, dtype: float64

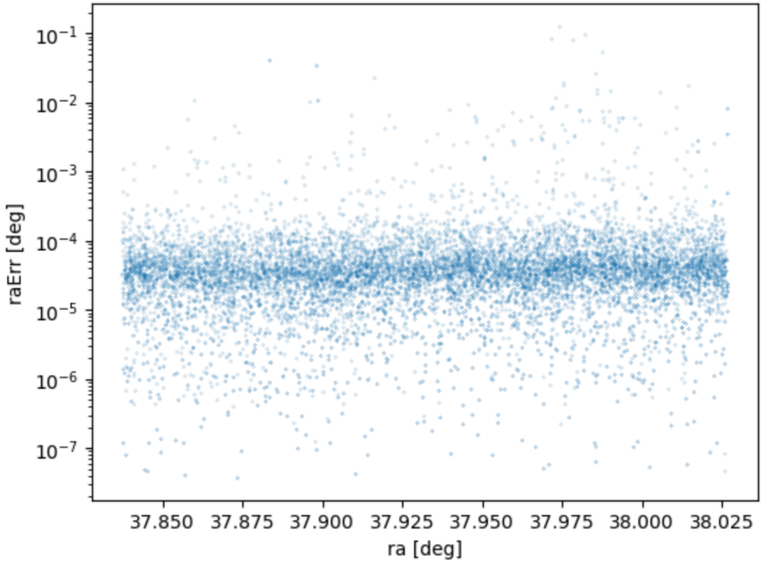
```
(array([453., 389., 373., 353., 367., 374., 338., 367., 396., 420., 434.,
        408., 404., 352., 401., 328., 421., 440., 385., 406., 412., 494.,
        427., 418., 437., 408., 434., 380., 428., 443.]),
 array([37.83723935, 37.84355709, 37.84987483, 37.85619257, 37.86251032,
        37.86882806, 37.8751458 , 37.88146355, 37.88778129, 37.89409903,
        37.90041678, 37.90673452, 37.91305226, 37.91937   , 37.92568775,
        37.93200549, 37.93832323, 37.94464098, 37.95095872, 37.95727646,
        37.96359421, 37.96991195, 37.97622969, 37.98254743, 37.98886518,
        37.99518292, 38.00150066, 38.00781841, 38.01413615, 38.02045389,
        38.02677164]),
 <BarContainer object of 30 artists>)
```




dec [deg]
7.025
7.000
6.975
6.950
6.925
6.900
6.875
6.850
37.850 37.875 37.900 37.925 37.950 37.975 38.000 38.025
ra [deg]

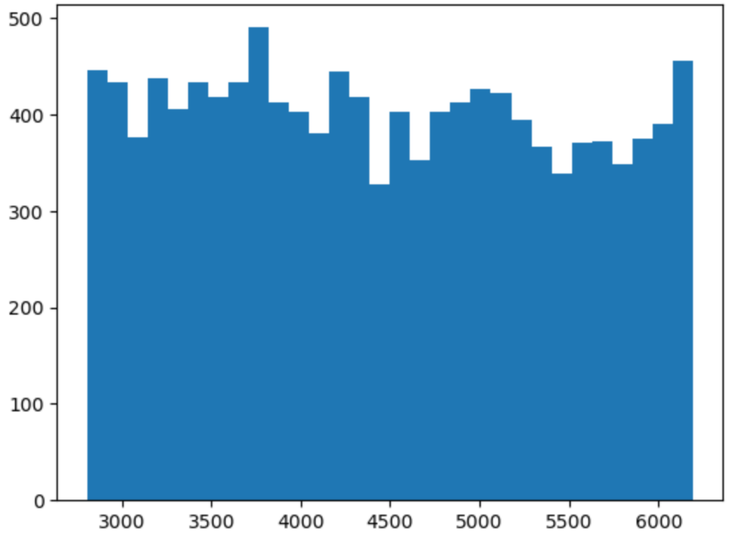

decErr [deg]
10^{-1}
10^{-2}
10^{-3}
10^{-4}
10^{-5}
10^{-6}
10^{-7}
6.850 6.875 6.900 6.925 6.950 6.975 7.000 7.025
dec [deg]


raErr
10^{-1}
10^{-2}
10^{-3}
10^{-4}
10^{-5}
10^{-6}
10^{-7}
i
g
r
z
refBand

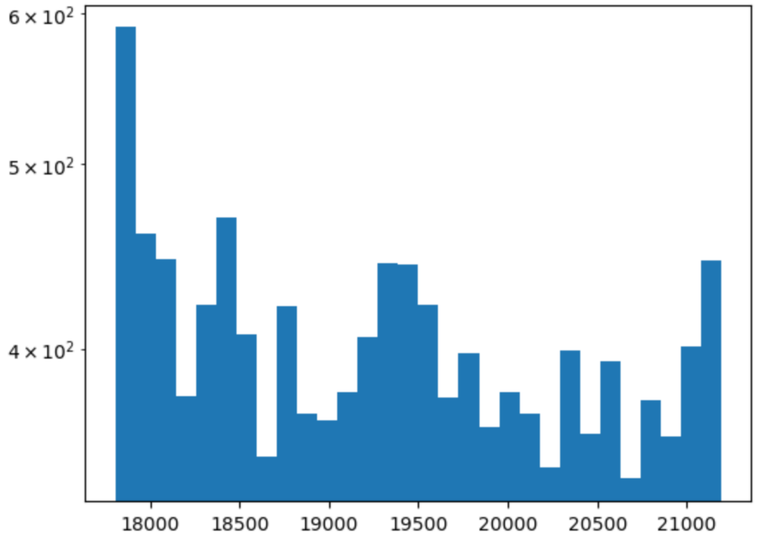

raErr [deg]
10^{-1}
10^{-2}
10^{-3}
10^{-4}
10^{-5}
10^{-6}
10^{-7}
37.850 37.875 37.900 37.925 37.950 37.975 38.000 38.025
ra [deg]

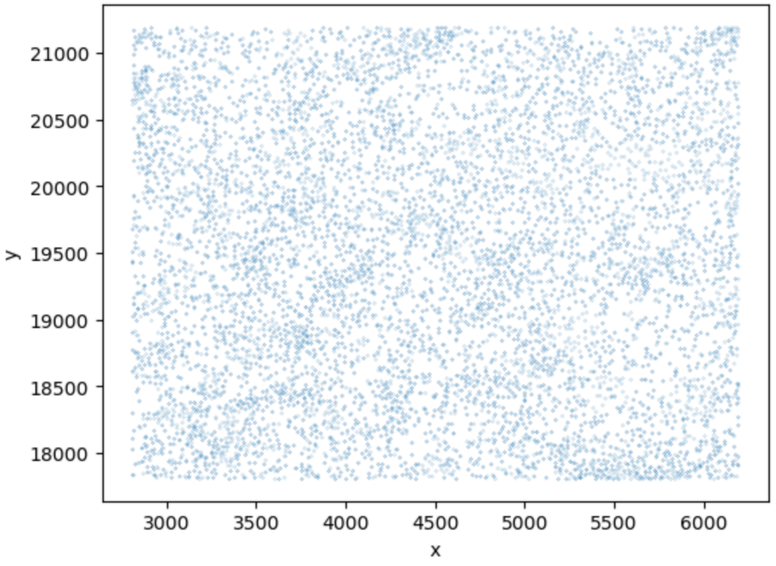
Name: x, Length: 12090, dtype: float64

115]: (array([446., 433., 376., 438., 405., 434., 418., 433., 490., 413., 403.,
381., 445., 418., 328., 402., 353., 402., 412., 427., 422., 395.,
367., 338., 370., 372., 348., 375., 390., 456.]),
array([2807. , 2919.8, 3032.6, 3145.4, 3258.2, 3371. , 3483.8, 3596.6,
3709.4, 3822.2, 3935. , 4047.8, 4160.6, 4273.4, 4386.2, 4499. ,
4611.8, 4724.6, 4837.4, 4950.2, 5063. , 5175.8, 5288.6, 5401.4,
5514.2, 5627. , 5739.8, 5852.6, 5965.4, 6078.2, 6191.]),
<BarContainer object of 30 artists>)

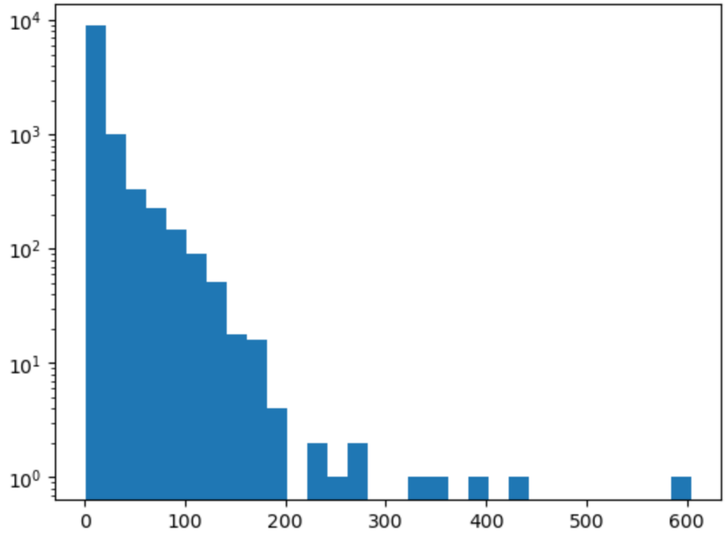


Name: y, Length: 12090, dtype: float64

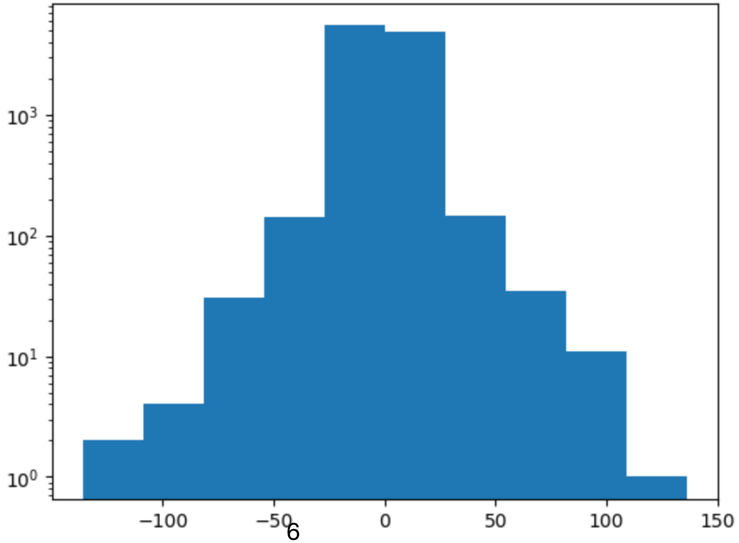




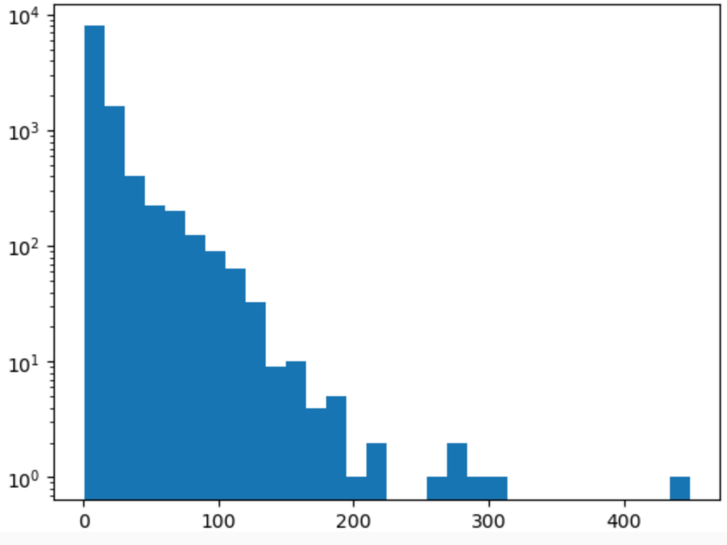
Name: shape_xx, Length: 12090, dtype: float64



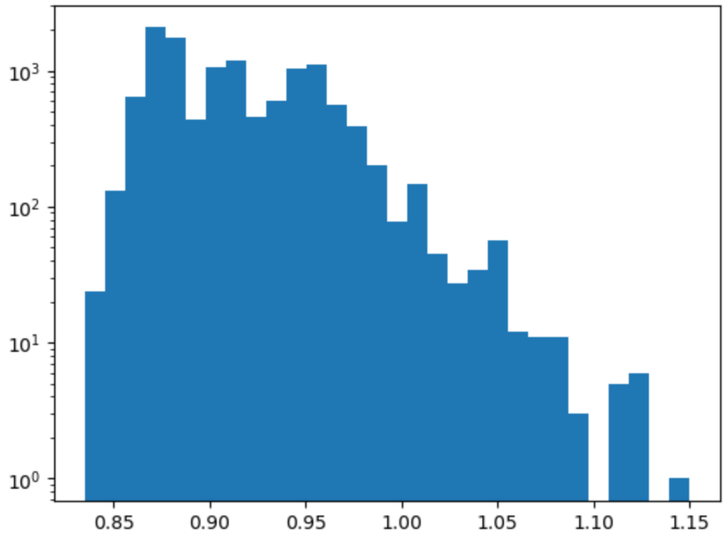
Name: shape_xy, Length: 12090, dtype: float64



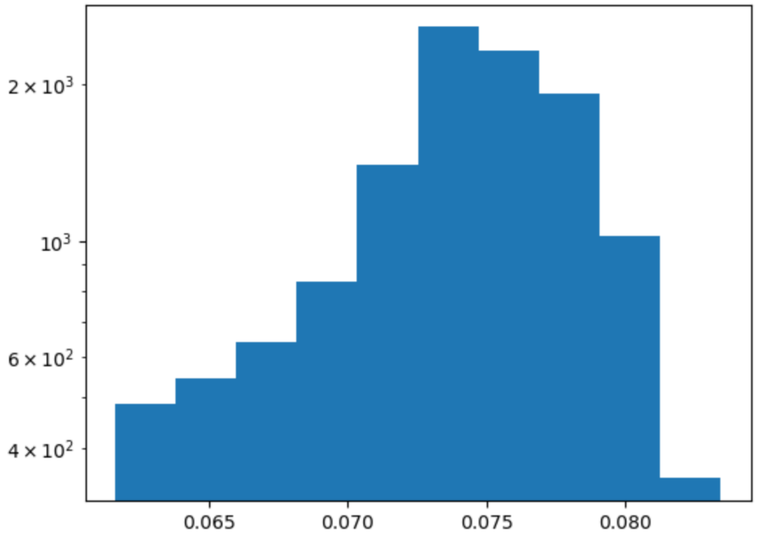
Name: shape_yy, Length: 12090, dtype: float64



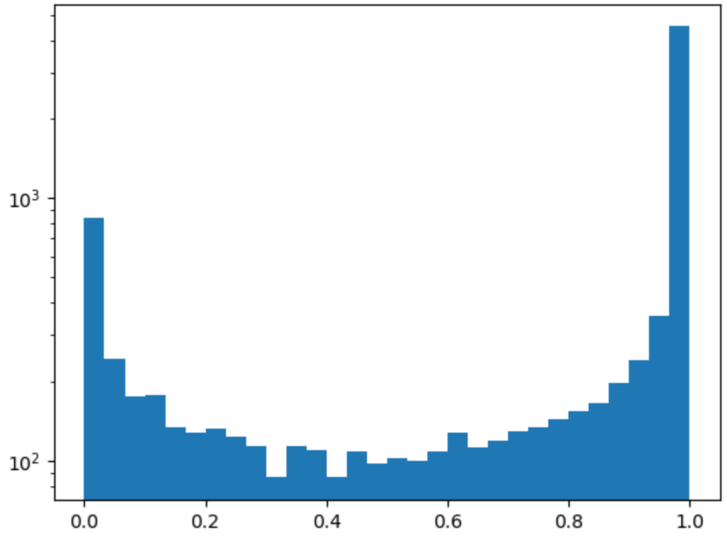
Name: refFwhm, Length: 12090, dtype: float64



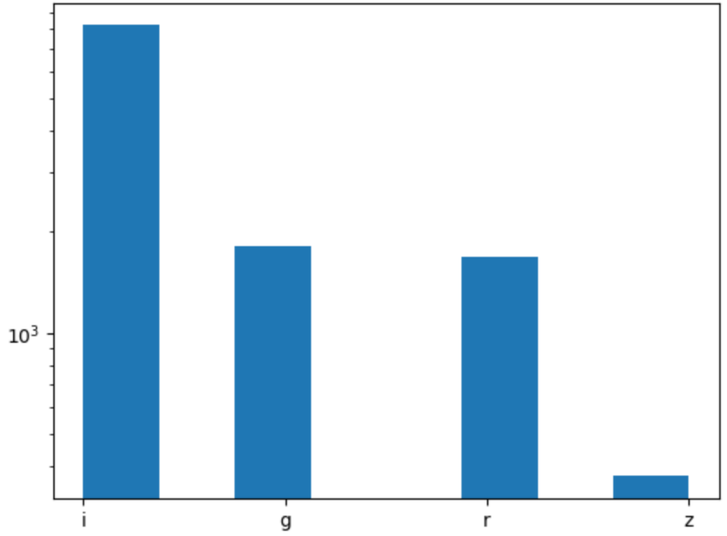
Name: ebv, Length: 12090, dtype: float64

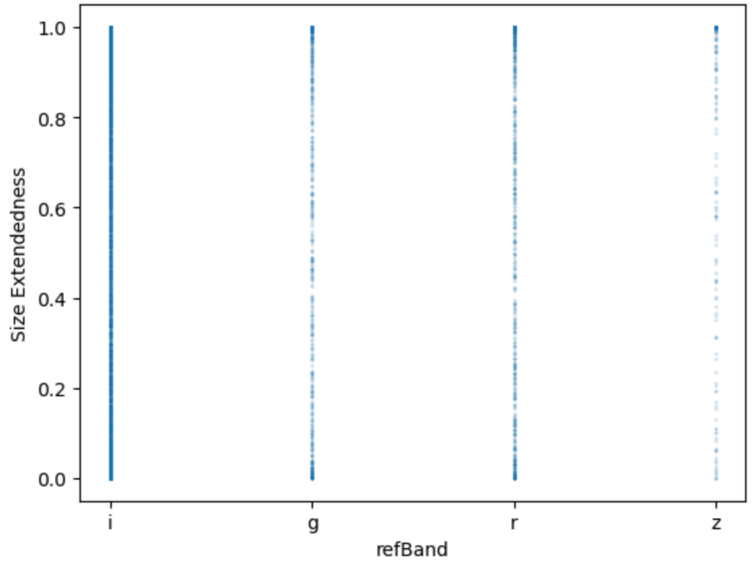


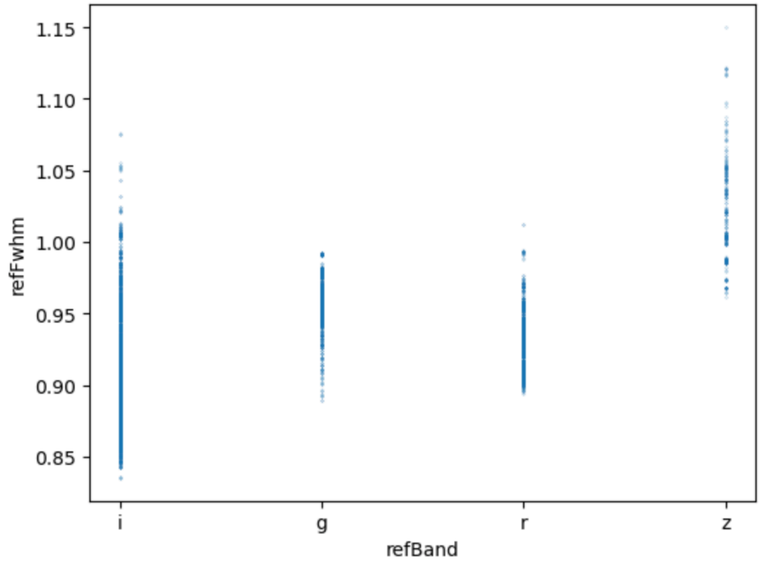
Name: refSizeExtendedness, Length: 12090, dtype: float64



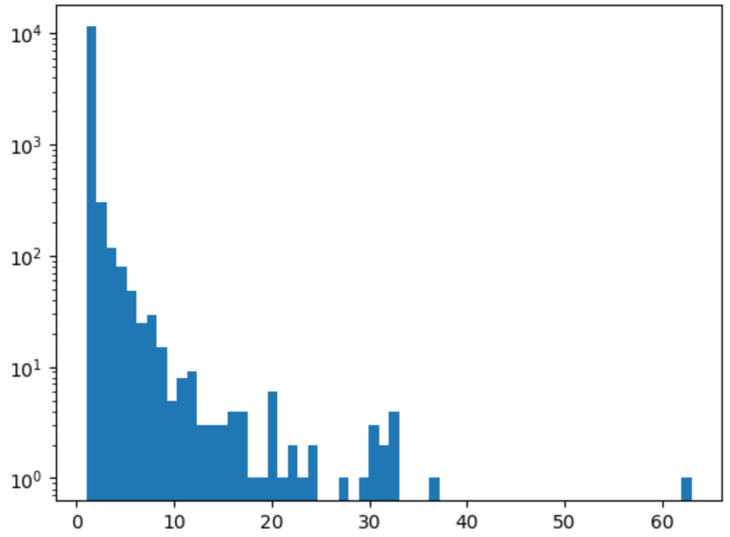
Name: refBand, Length: 12090, dtype: object



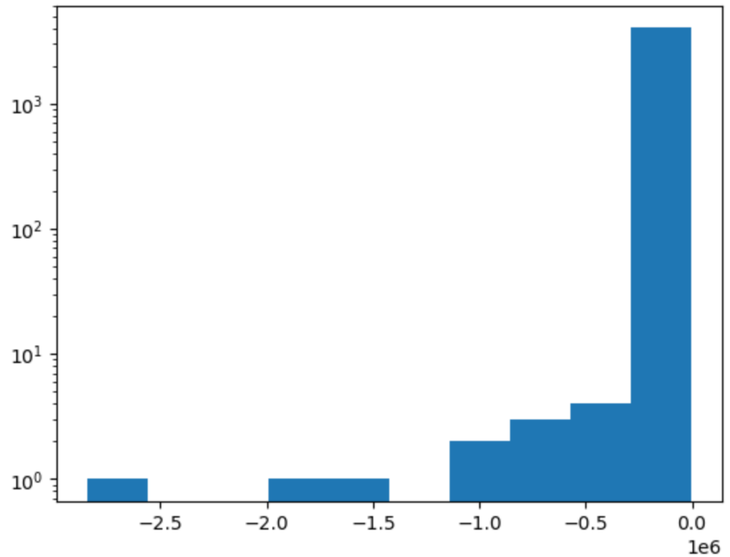




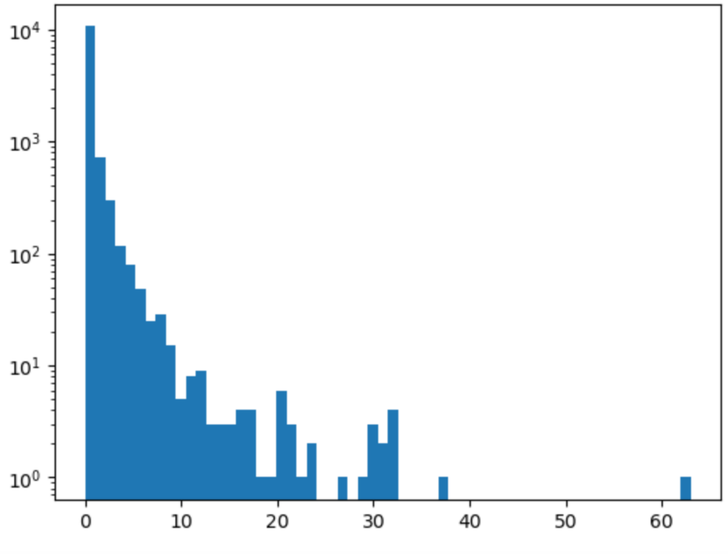
Name: deblend_nPeaks, Length: 12090, dtype: int32



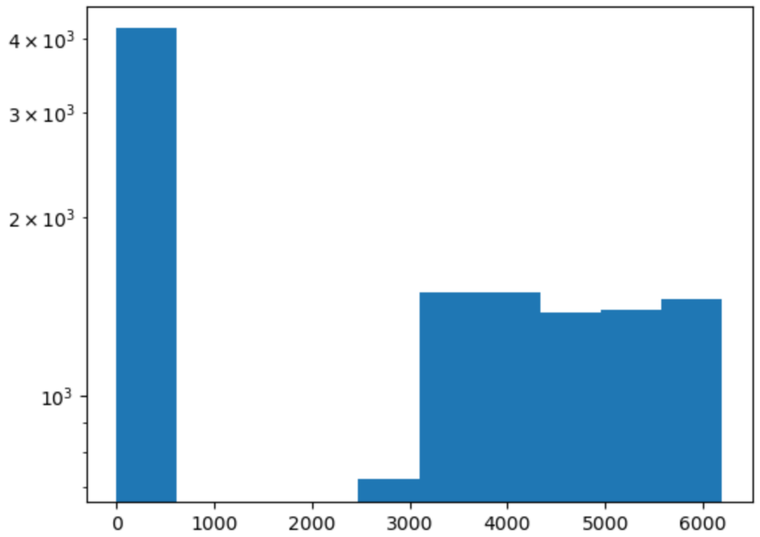
Name: deblend_logL, Length: 12090, dtype: float32



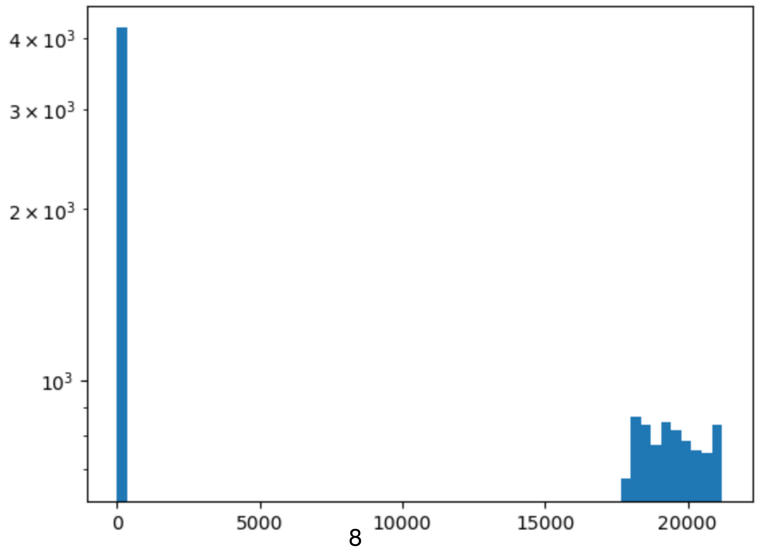
Name: deblend_nChild, Length: 12090, dtype: int32



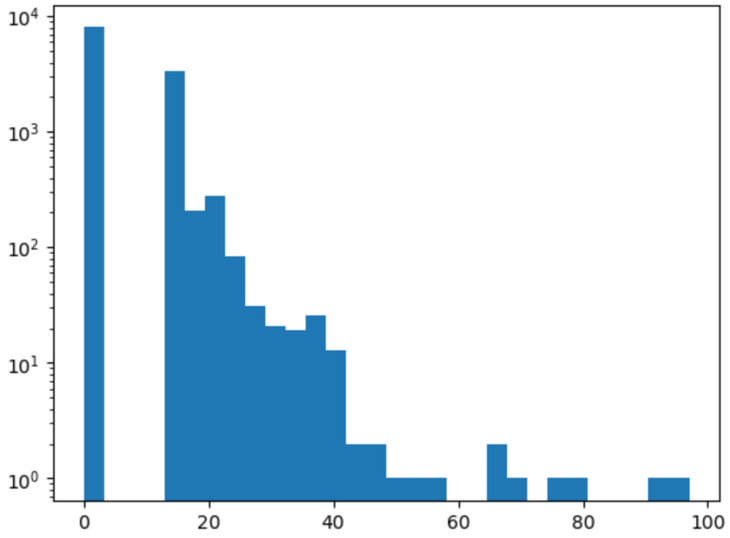
Name: deblend_peak_center_x, Length: 12090, dtype: int32

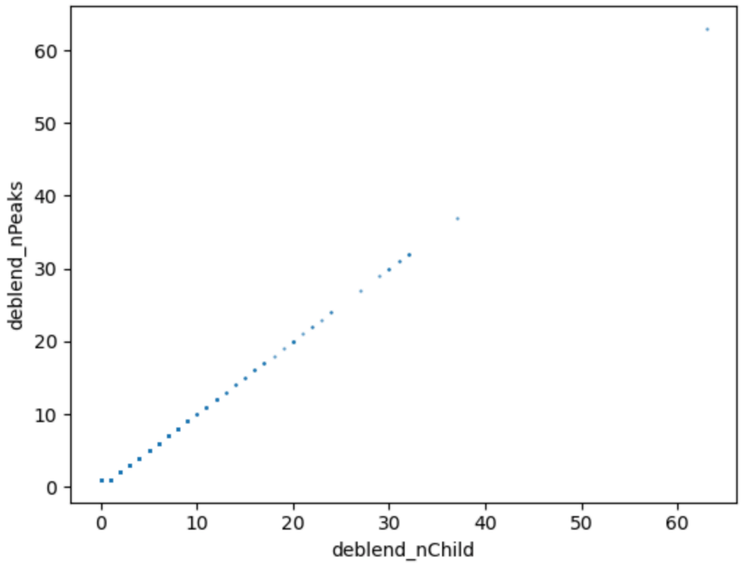


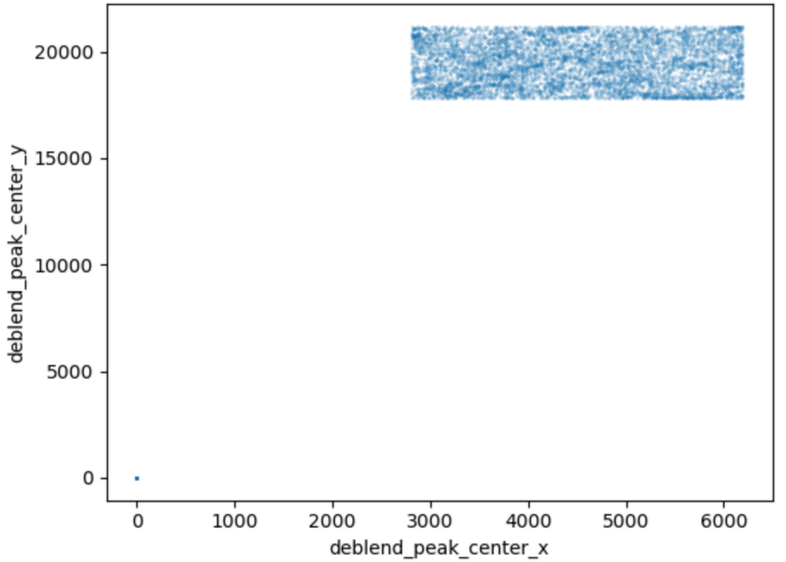
Name: deblend_peak_center_y, Length: 12090, dtype: int32



Name: deblend_iterations, Length: 12090, dtype: int32

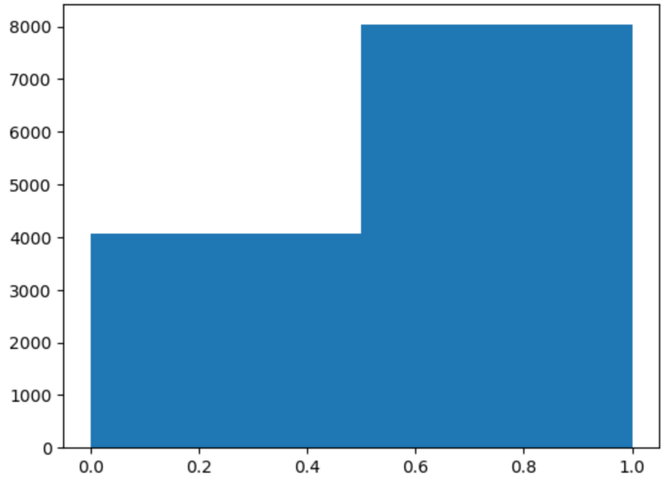



deblend_nPeaks
deblend_nChild
0
10
20
30
40
50
60


deblend_peak_center_y
deblend_peak_center_x
0
5000
10000
15000
20000
0
1000
2000
3000
4000
5000
6000

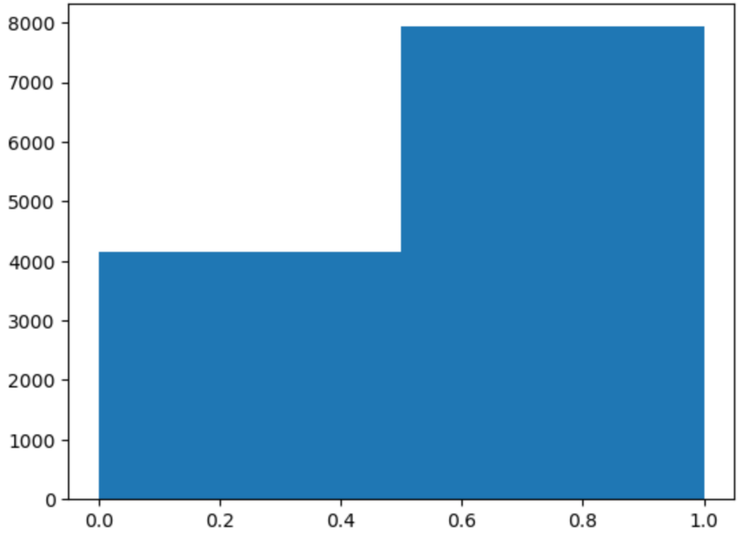
Name: detect_isDeblendedSource, Length: 12090, dtype: bool

1]: (array([4061., 8029.]),
 array([0. , 0.5, 1.]),
 <BarContainer object of 2 artists>)



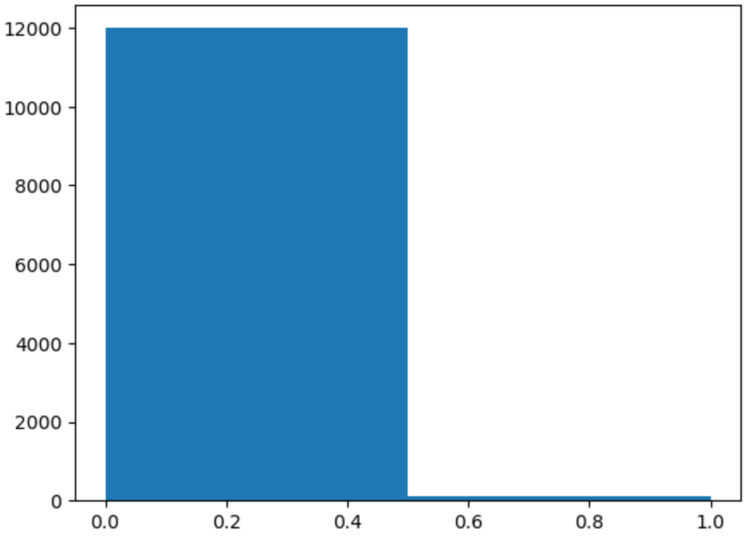
Name: detect_isDeblendedModelSource, Length: 12090, dtype: bool

[114]: (array([4161., 7929.]),
 array([0. , 0.5, 1.]),
 <BarContainer object of 2 artists>)



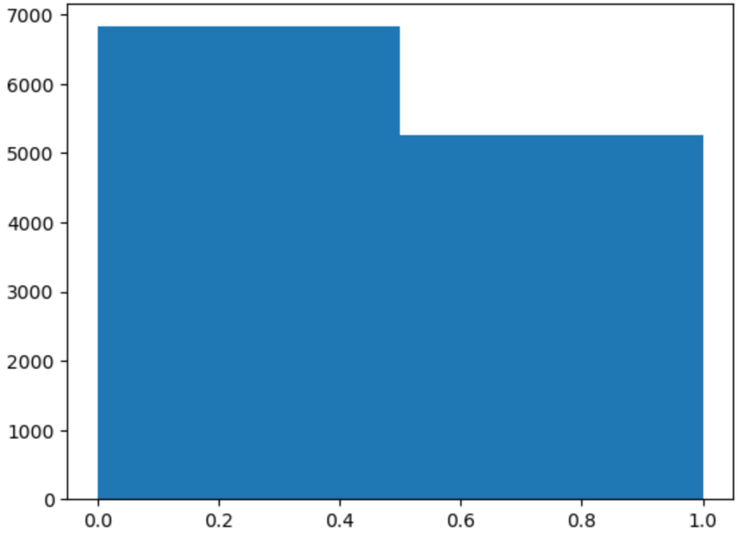
Name: deblend_skipped, Length: 12090, dtype: bool

[113]: (array([11990., 100.]),
 array([0. , 0.5, 1.]),
 <BarContainer object of 2 artists>)



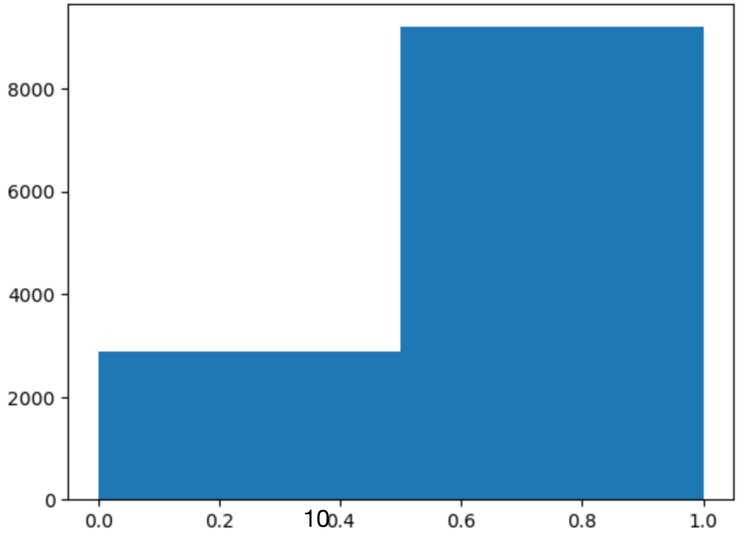
Name: detect_fromBlend, Length: 12090, dtype: bool

1]: (array([6826., 5264.]),
 array([0. , 0.5, 1.]),
 <BarContainer object of 2 artists>)



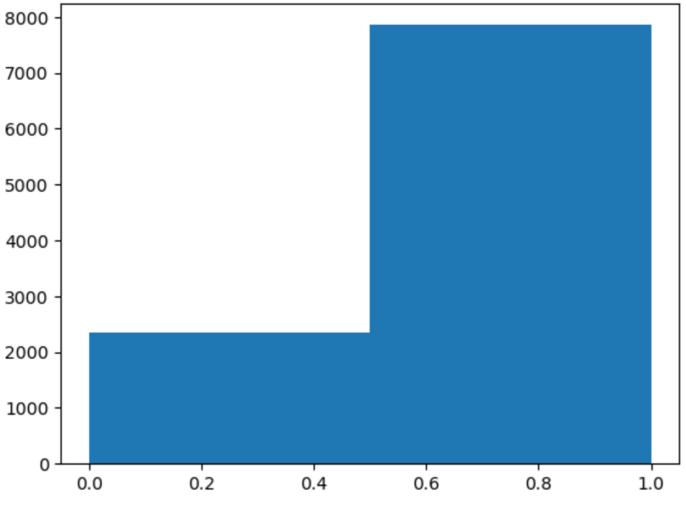
Name: detect_isPatchInner, Length: 12090, dtype: bool

[112]: (array([2894., 9196.]),
 array([0. , 0.5, 1.]),
 <BarContainer object of 2 artists>)



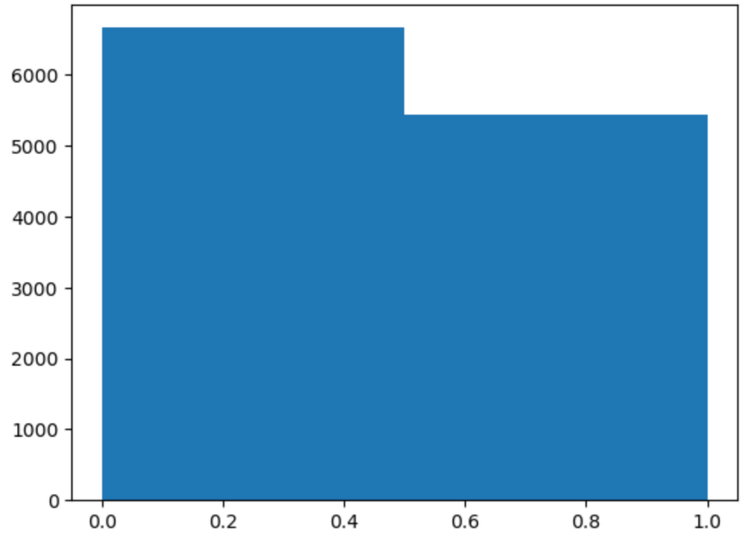
Name: refExtendedness, Length: 12090, dtype: float64

121]: (array([2341., 7856.]),
 array([0. , 0.5, 1.]),
 <BarContainer object of 2 artists>)



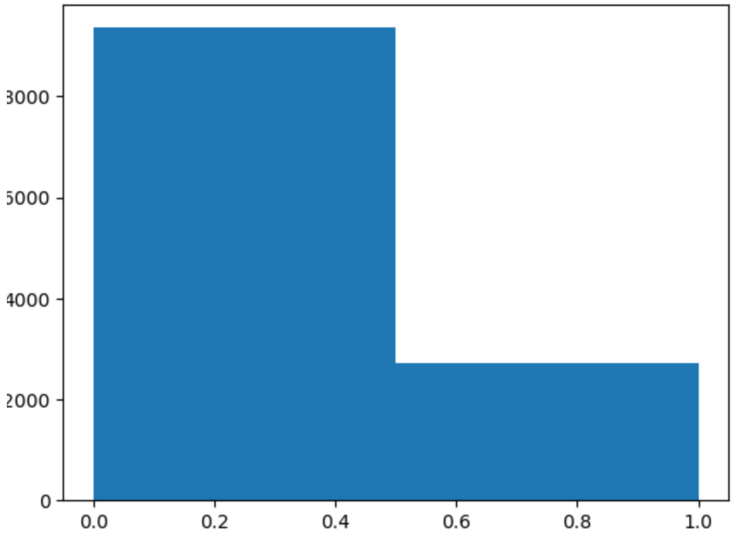
Name: detect_isIsolated, Length: 12090, dtype: bool

[110]: (array([6660., 5430.]),
 array([0. , 0.5, 1.]),
 <BarContainer object of 2 artists>)

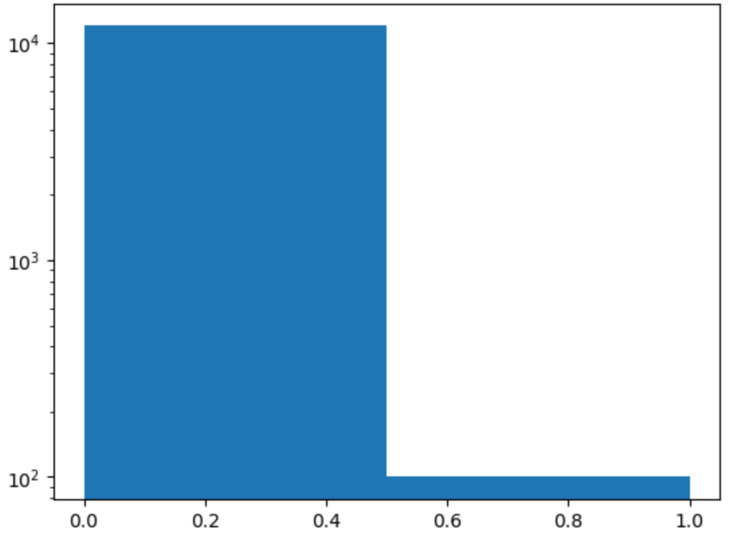


lame: shape_flag, Length: 12090, dtype: bool

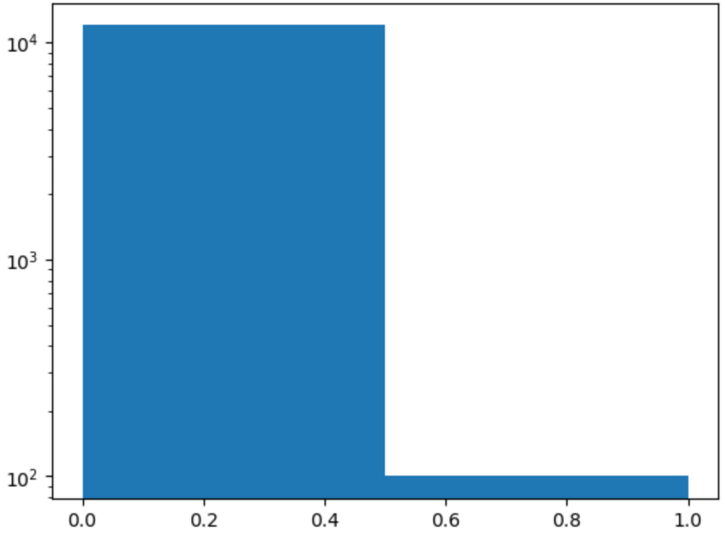
array([9359., 2731.]),
array([0. , 0.5, 1.]),
<BarContainer object of 2 artists>)



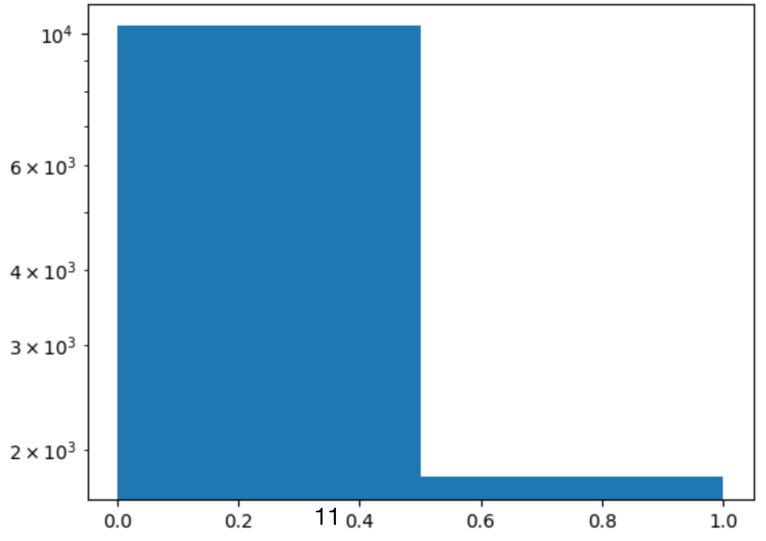
Name: merge_peak_sky, Length: 12090, dtype: bool



Name: sky_object, Length: 12090, dtype: bool

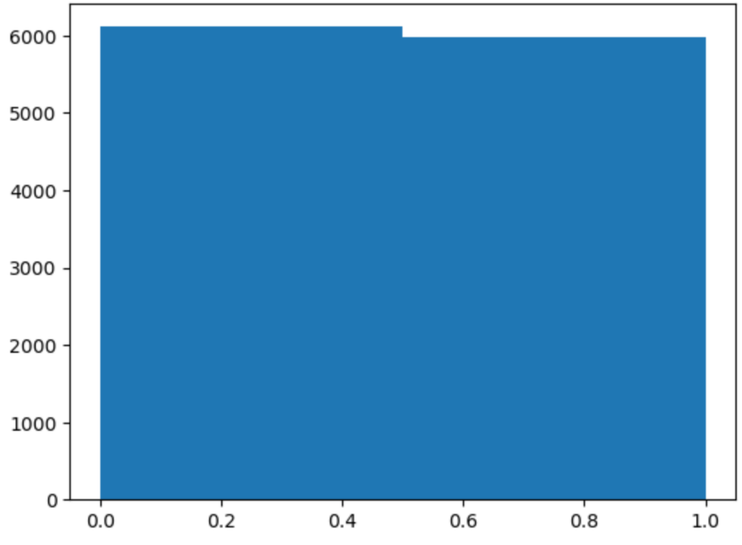


Name: xy_flag, Length: 12090, dtype: bool



Name: detect_isPrimary, Length: 12090, dtype: bool

81]: (array([6115., 5975.]),
 array([0. , 0.5, 1.]),
 <BarContainer object of 2 artists>)



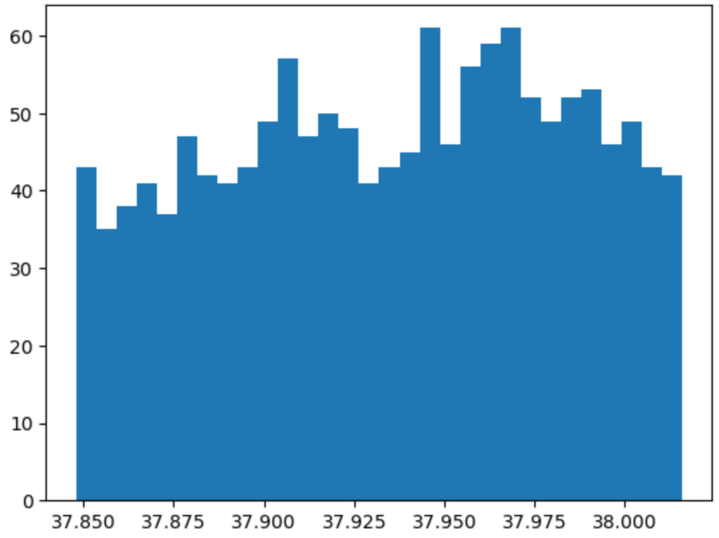
Selection :

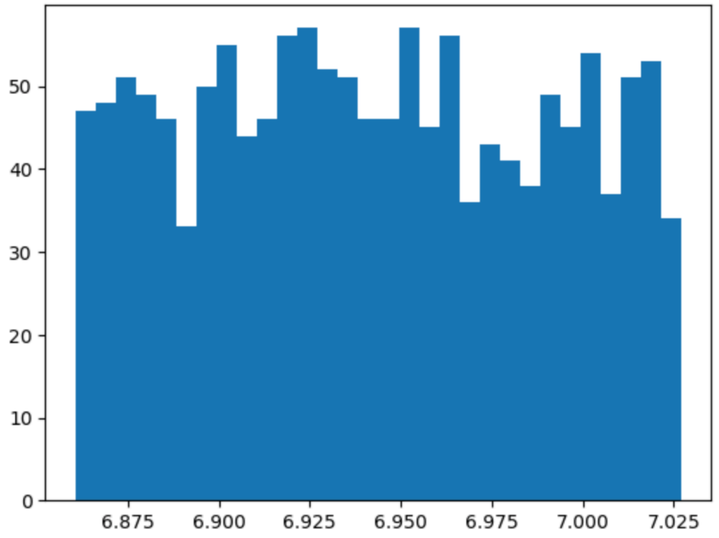
```
selection = (
    (objects['detect_isPrimary'] == True) &
    (objects['refExtendedness'] == True) &
    (objects['detect_isIsolated'] == True) &
    (objects['detect_fromBlend'] == False)
)
```

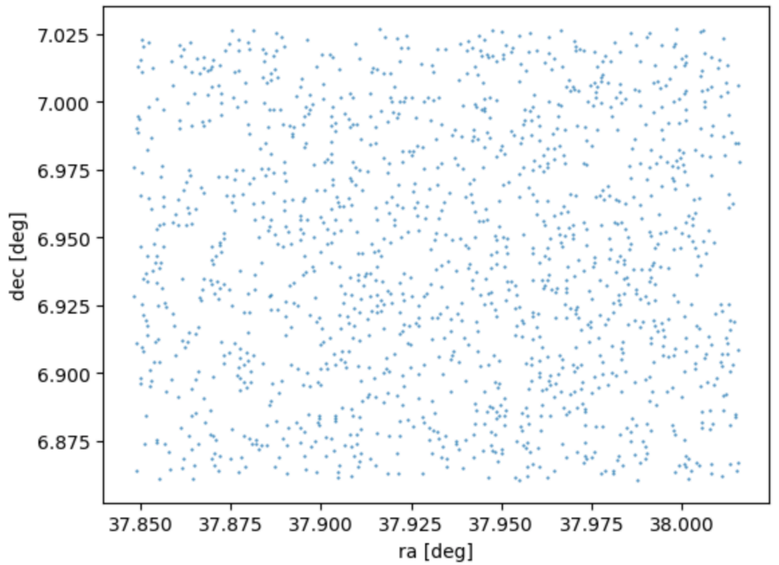
to remove parent-childs from blends.

Flag explanation: https://pipelines.lsst.io/modules/lsst.pipe.tasks/deblending-flags-overview.html

Get 1416 objects (out of 12090)

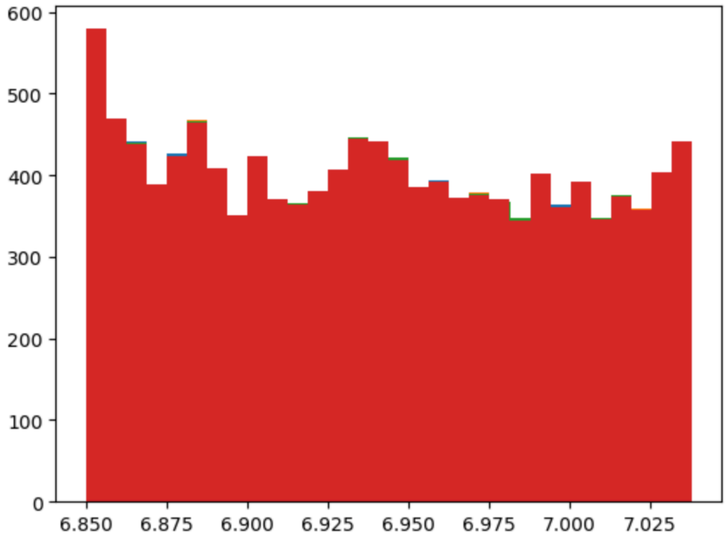


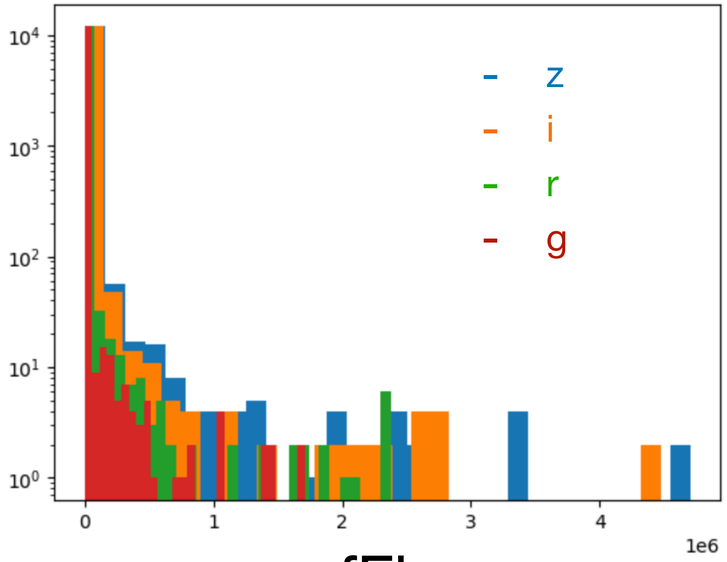




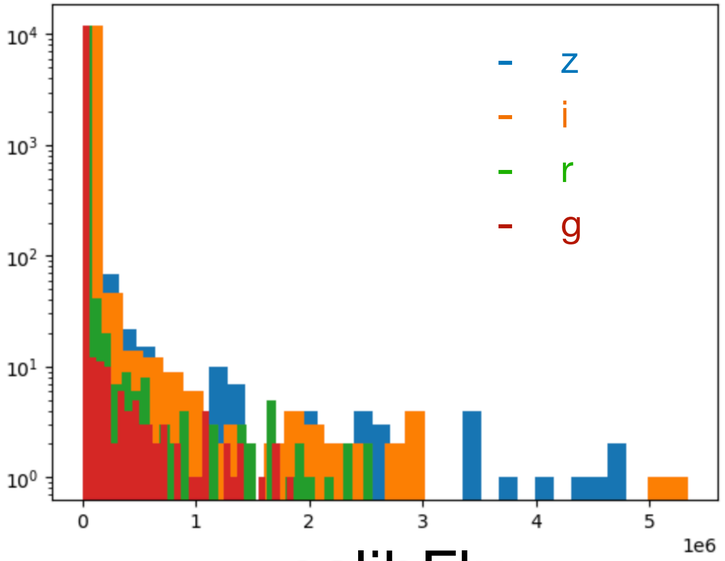
band studies

four bands dec overlaid

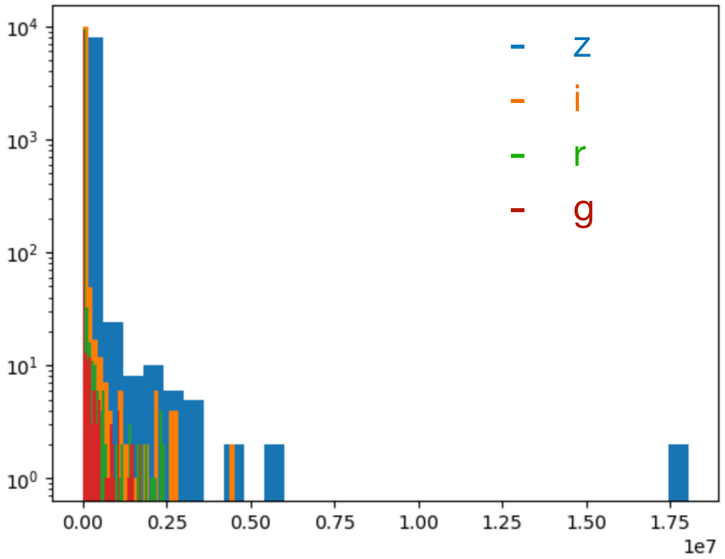




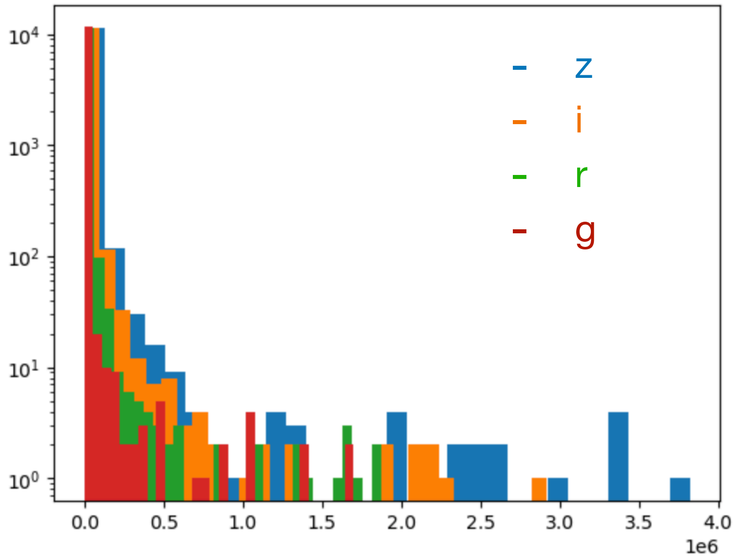
psfFlux



calibFlux

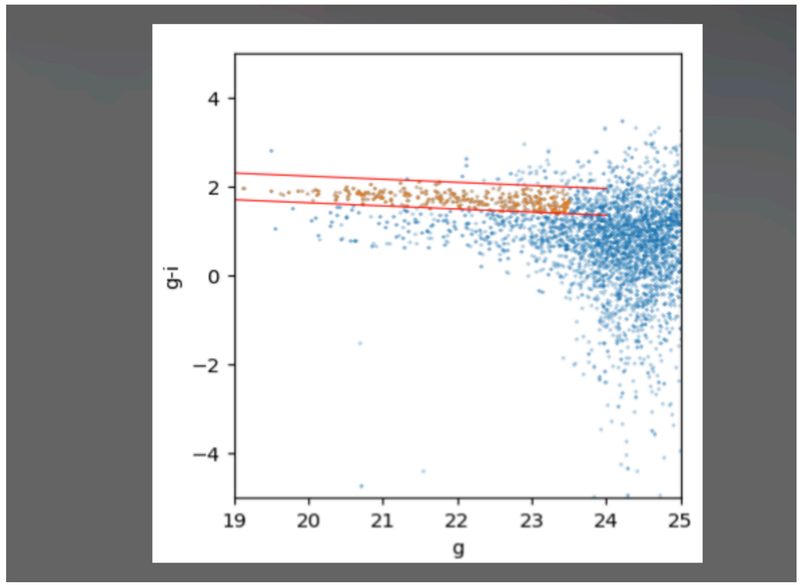


gaapOptimalFlux



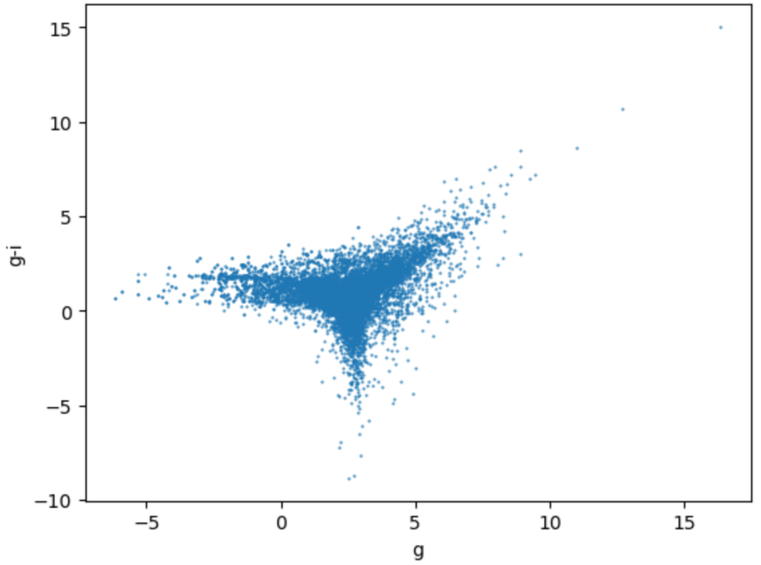
cModelFlux

Celine's plot



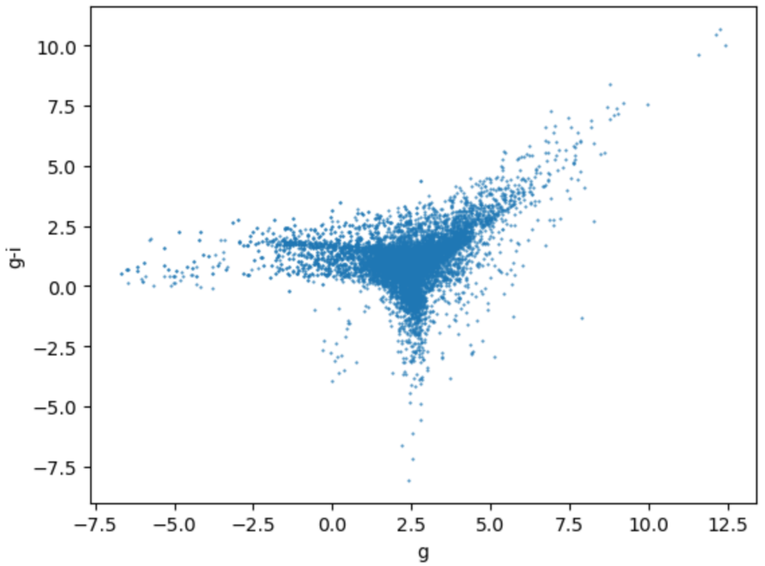
g_cModelFlux

i_cModelFlux



g_gaapOptimalFlux

i_gaapOptimalFlux



https://pstn-001.lsst.io/fluxunits.pdf (On the choice of LSST flux units)

2.10 AB magnitudes

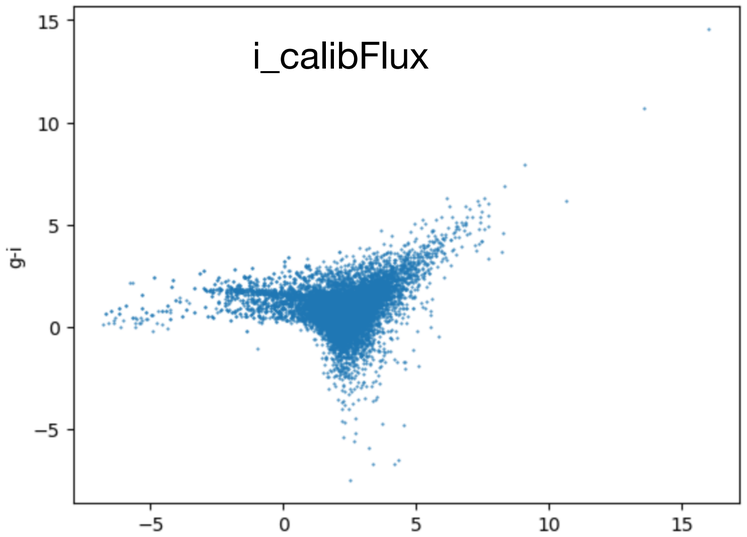
The in-band flux in astronomy is often reported on a magnitude scale, and LSST has adopted AB magnitudes defined as

$$m_b^{AB} = -2.5 \log_{10} \left(\frac{F_b}{F_{AB}} \right). \quad (19)$$

where F_{AB} = 3631 Jy. The same expression applies to F_b^{std}, or any other flux. The choice of normalization flux F_{AB} results in correspondence between AB magnitudes and Vega magnitudes in the Johnson's V band (i.e., approximately, 3631 Jy is the flux of Vega in the standard V band).

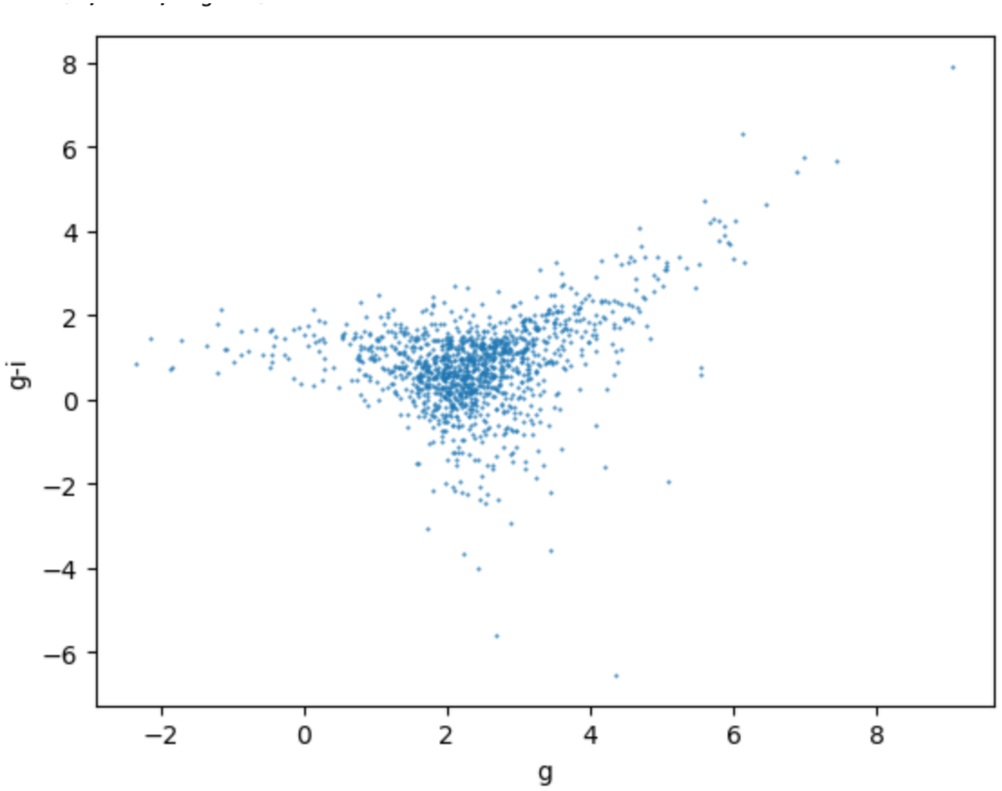
g_calibFlux

i_calibFlux



After selection:

```
selection = (
    (objects['detect_isPrimary'] == True) &
    (objects['refExtendedness'] == True) &
    (objects['detect_isIsolated'] == True) &
    (objects['detect_fromBlend'] == False)
)
```



Code here : https://github.com/lsst-sitcom/comcam_clusters/blob/main/ComCam_StarterKit.ipynb (but not clear to me…)