

PhoSim-NIRCam: Photometry

- To determine the magnitude zero-point for a given simulated image, create a point-source image using the same filter and compare the input magnitude and measured source count, which is the number of electrons.
- For this purpose, we provide two catalogs, **star_sw.cat** and **star_lw.cat** (see **mkimage** for how to create images using these catalogs). Don't forget to set the filter number properly in the catalogs. These catalogs will produce a point-source image with a brightness of 22 AB mag. Since the source is defined with a flat-fv SED, its brightness, when expressed in the AB magnitude, is always 22 mag regardless of the filter selected.
- The catalogs **star_sw.cat** and **star_lw.cat**, when used as they are, will create F200W and F356W point-source images with an integration time of 600 sec. The measured source-flux counts are 167,268 e- for F200W (with an $r=3.37''$ aperture) and 153,418 e- for F356W (with an $r=6''$ aperture), so the corresponding magnitude zero-points (i.e., AB mag for e-/s) are,

$$M_{\text{zero}}(\text{F200W}) = 22 + 2.5 \log (167268/600) = 28.11$$

$$M_{\text{zero}}(\text{F356W}) = 22 + 2.5 \log (153418/600) = 28.02$$

The zero-points for other filters can be calculated in a similar manner.

- Our preliminary analysis shows that the magnitude zero-points measured with PhoSim-NIRCam images are generally within 10-20% of the expected values. However, please note that an extensive photometric analysis is yet to be carried out.