Stellar Locus Regression for SVA1 on a HEALPix Grid

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SVA1 Telecon

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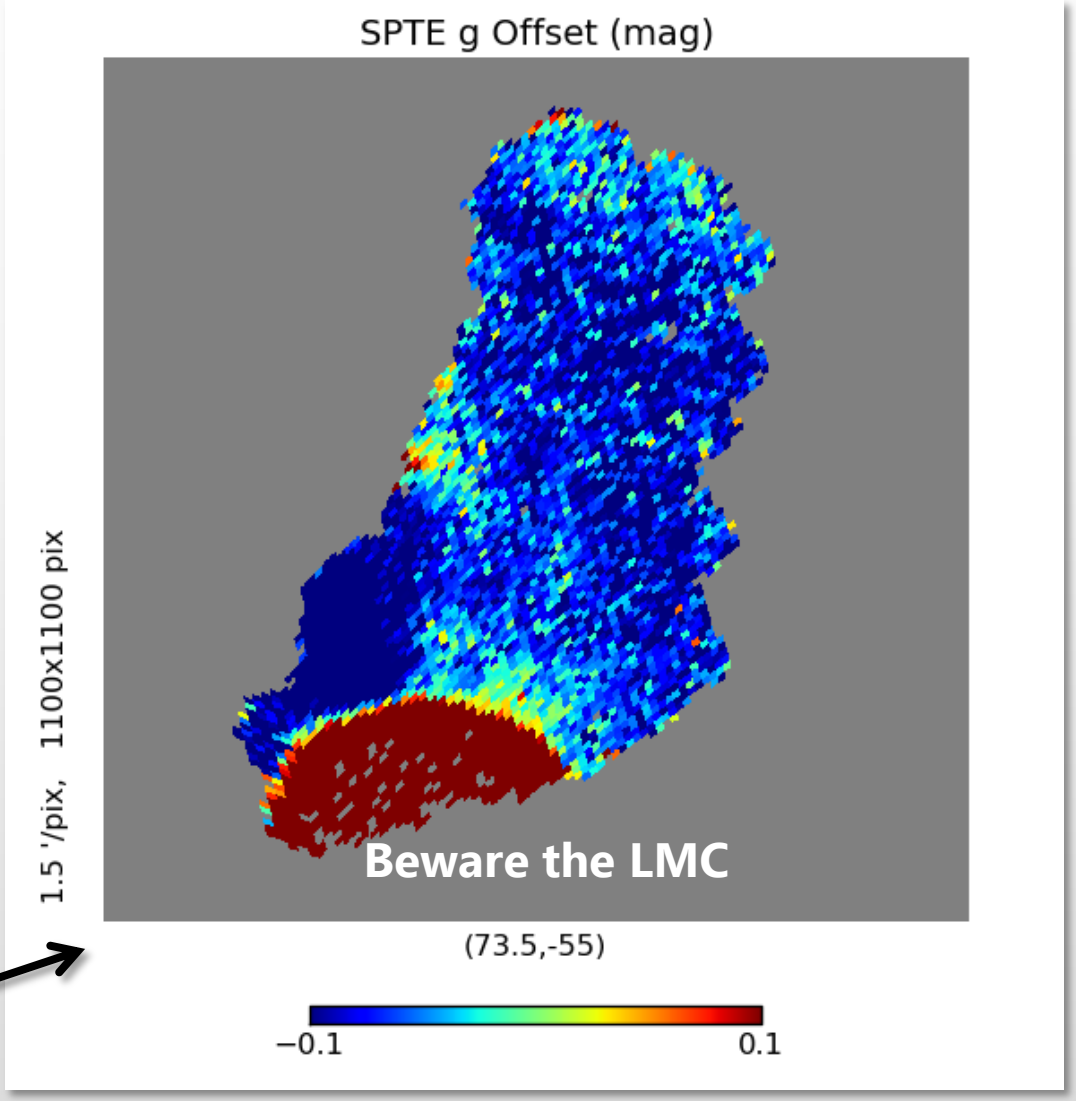
Zeropoint Offset Maps

Use stellar locus regression (SLR) on sub-degree scale to provide check of SVA1 photometric calibration (using 2MASS *J* for absolute reference)

Interstellar dust extinction should be automatically accounted for by SLR, but difficult to distinguish from other photometric calibration effects

Galactic dust layer is thin (50-100 pc) so majority of DES stars are behind the dust when looking at highGalactic latitudes

Zoom in of the SPT-E region



Data Products Overview

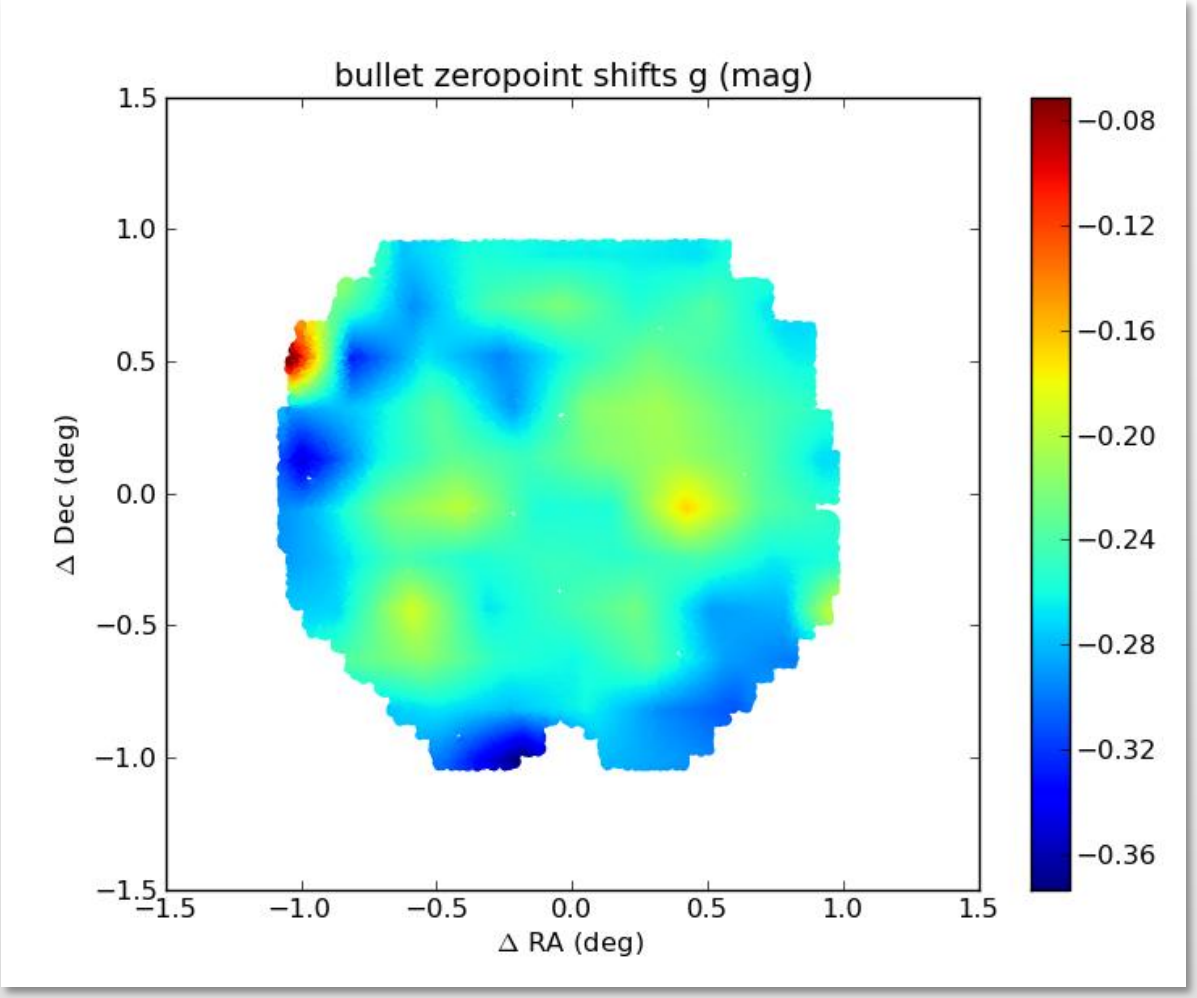
- SLR zeropoint shift maps for SVA1 for *griz* are now available as HEALPix maps stored in FITS format
  - 14′ and 28′ resolutions (spatial binning scale for stars)
- Python class to interface with maps
  - Returns zeropoint shift as function of (RA, Dec) and also quality flag
  - Option to fill in periphery pixels of SLR fitted region
  - Option to perform bi-linear interpolation

https://cdcvs.fnal.gov/redmine/projects/descalibration/wiki/Stellar_Locus_Regression_for_SVA1_on_HEALPix_Grid

Interpolation Example

g-band zeropoint offsets for the Bullet cluster field prepared for the SV cluster weak-lensing project

(Meant for illustration purpose, actually a different data set than SVA1)



https://cdcvs.fnal.gov/redmine/projects/deswlwg/wiki/SV_Cluster_SLR_Revisited

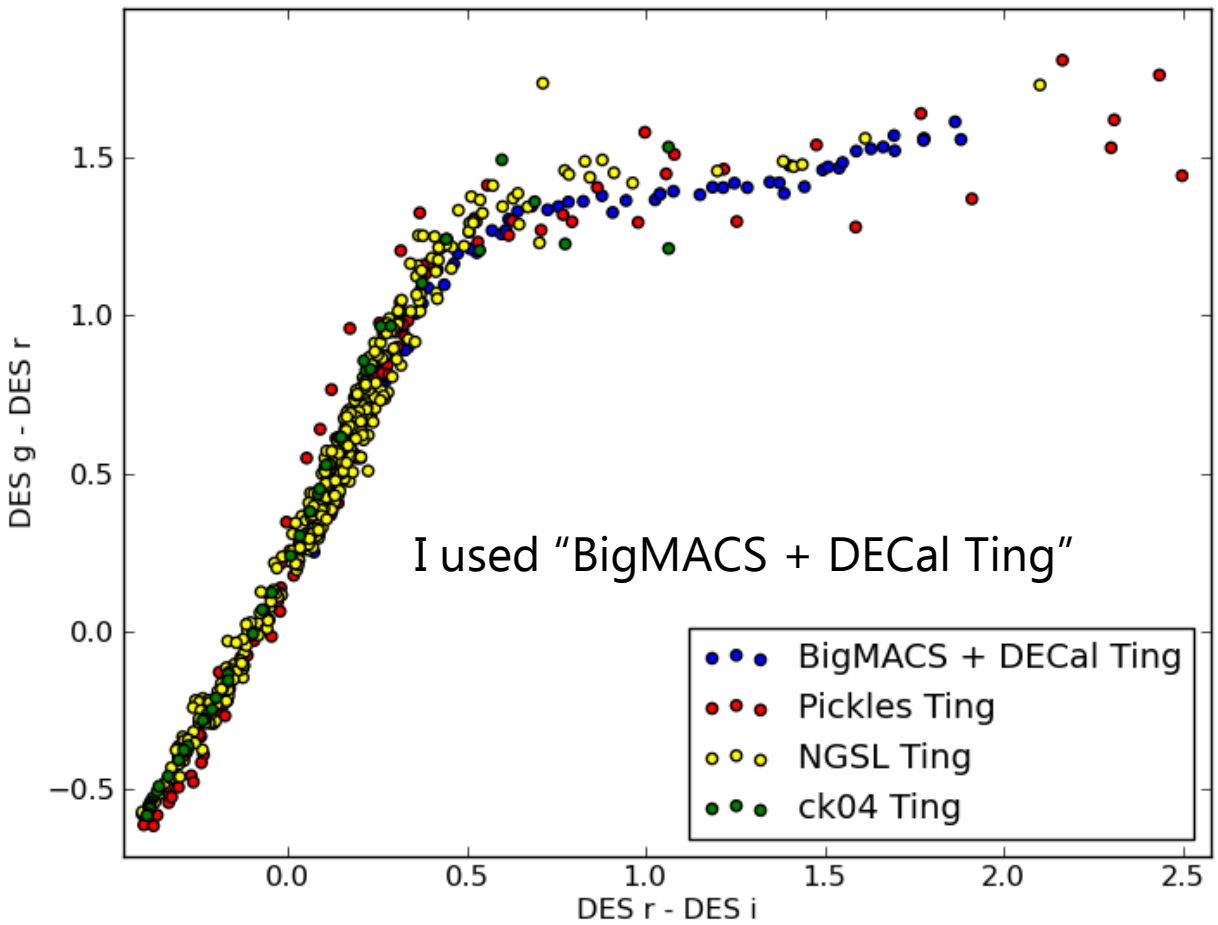
Fit Quality Flag Meanings

0 -> Object in HEALPix pixel with SLR fit

1 -> Object in peripheral pixel to SLR fitted region, use median shift of neighboring valid pixels

2 -> Object in pixel with no fitted neighbor pixels, i.e., no direct SLR constraint, use median of objects in valid pixels

Stellar Locus Comparison



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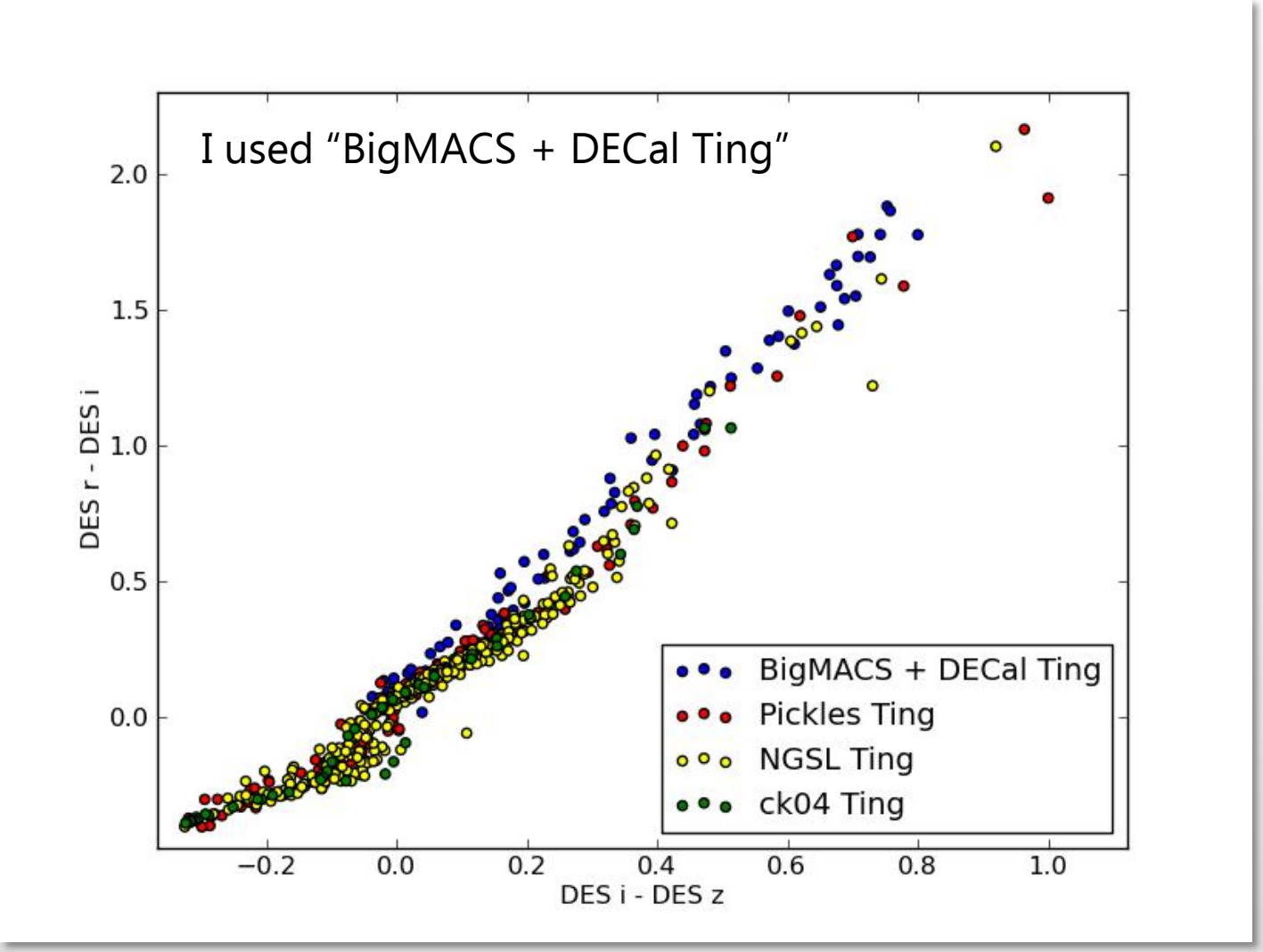


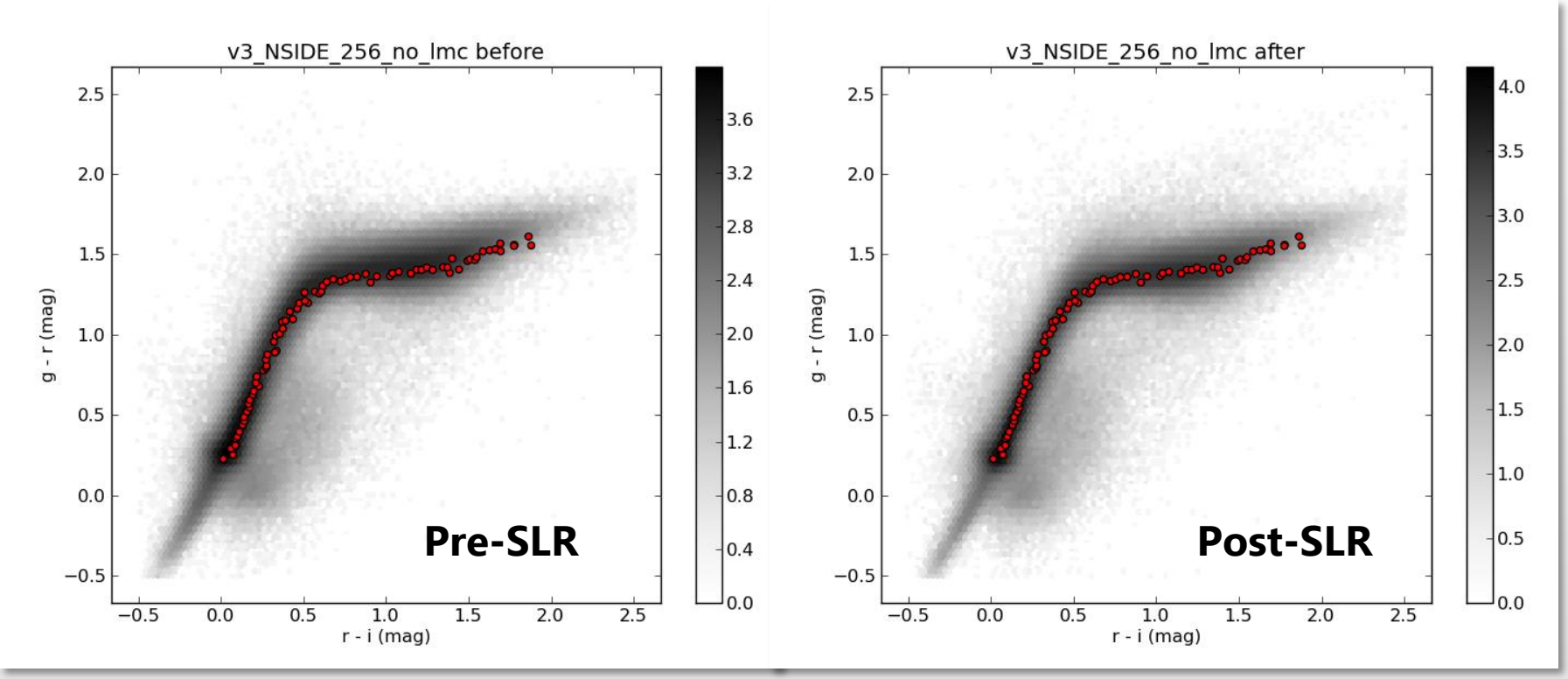
Example Results Plots

- The following examples are for the NSIDE = 256 case (14′ resolution)

- Many more diagnostic plots on redmine page

Color-color Diagrams

Excluding LMC Region: 70 deg < RA < 90 deg AND Dec < -61 deg



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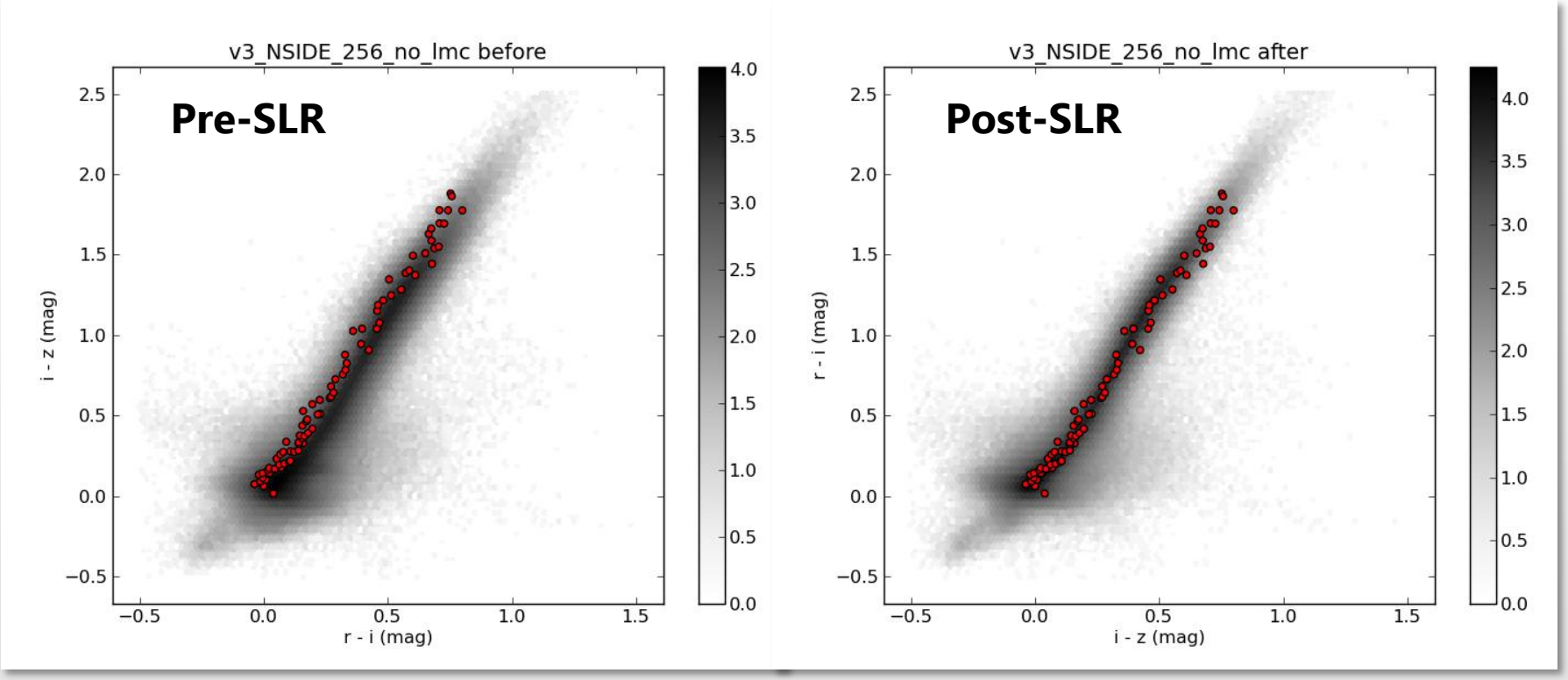

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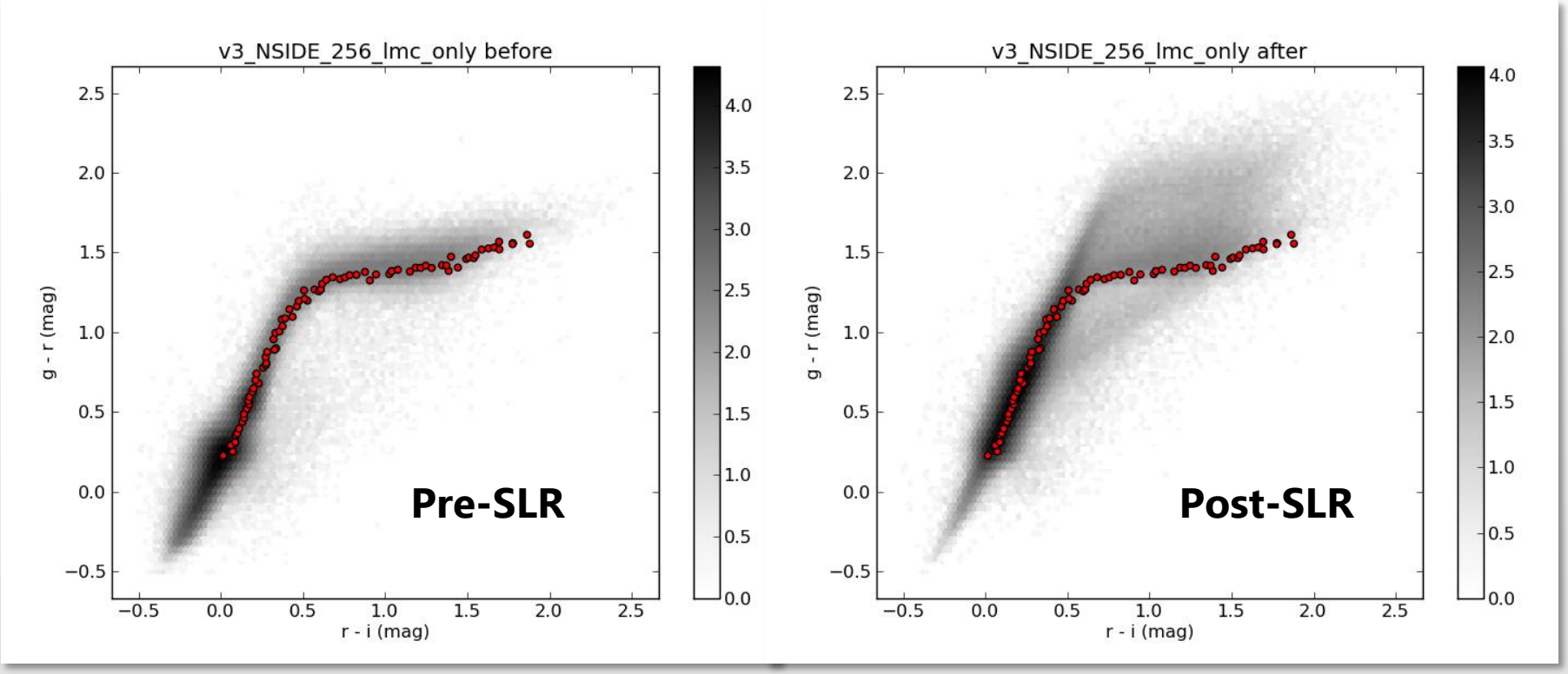
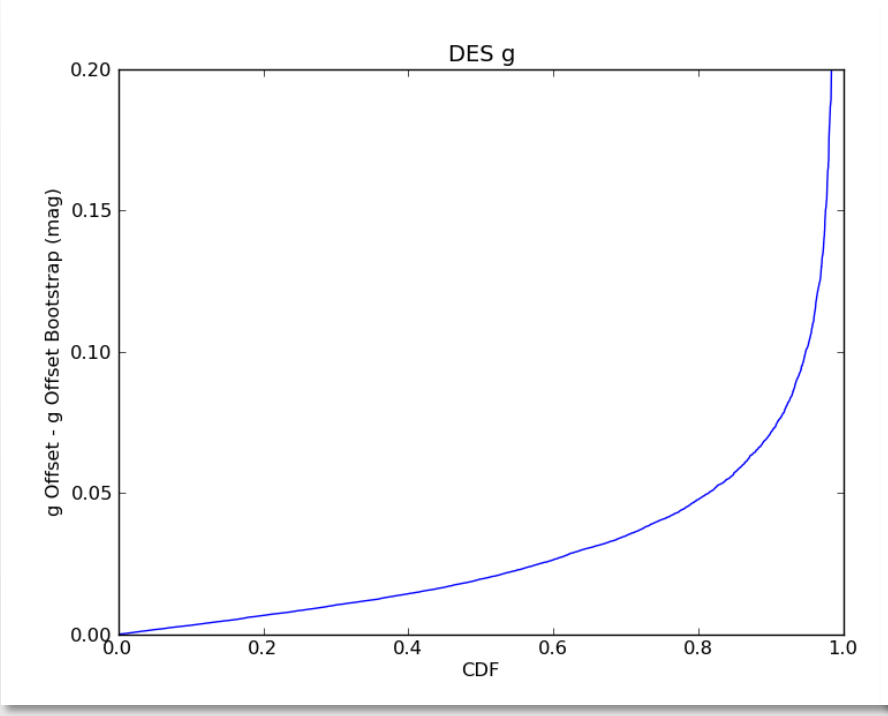
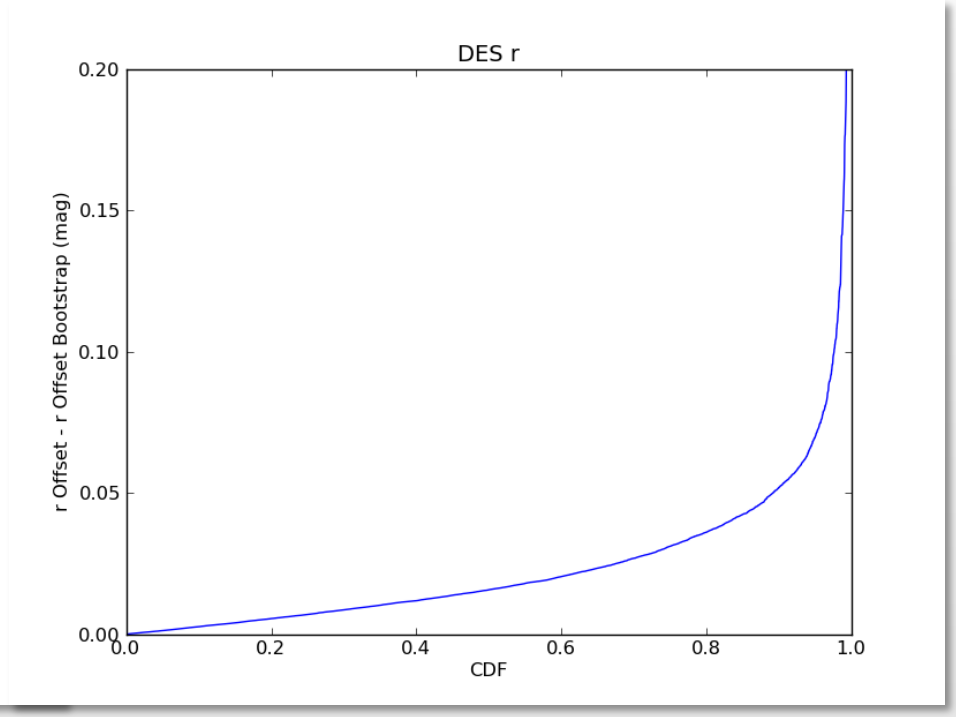


Watch out in the SPT-E region around the LMC, SLR fit failures evident!

Statistical Precision





Estimate statistical precision via bootstrap of stellar sample. The CDF represents the distribution of fitted zeropoint shift differences for the all pixels for the original vs. bootstapped sample

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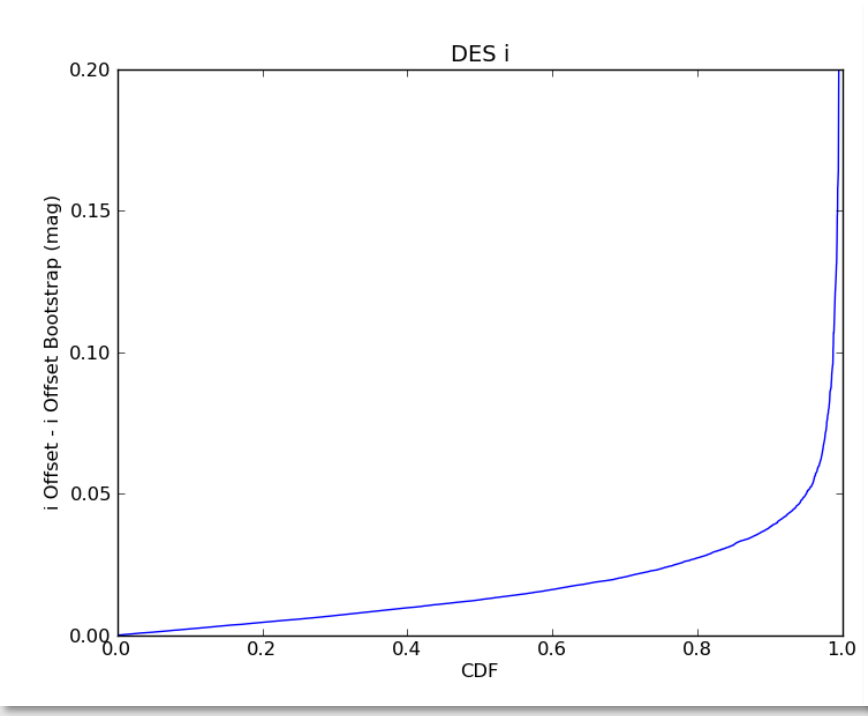

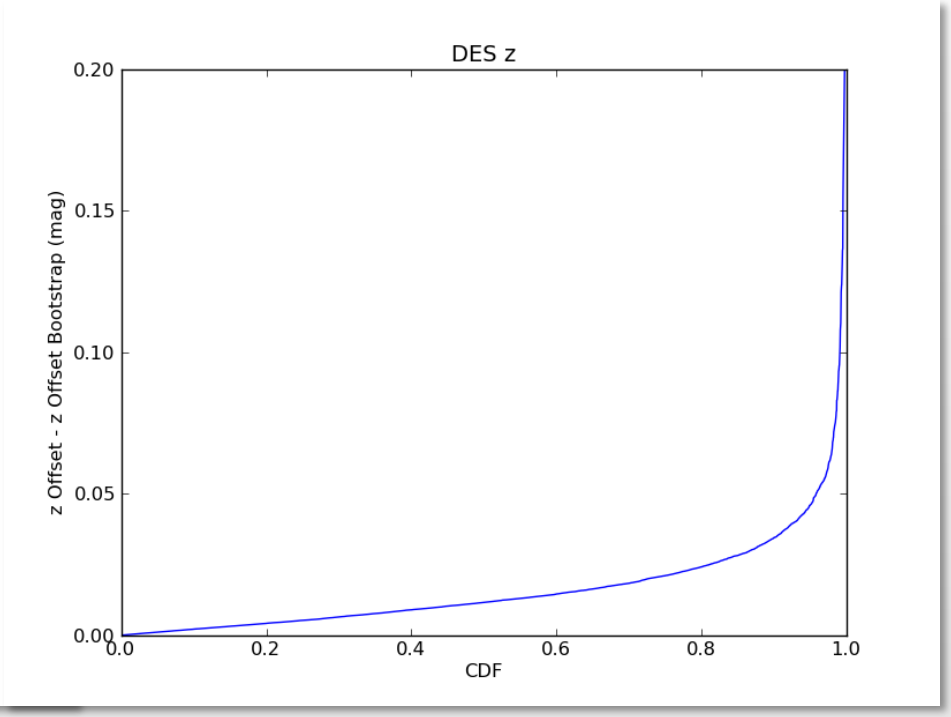

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