

REC-TRUE

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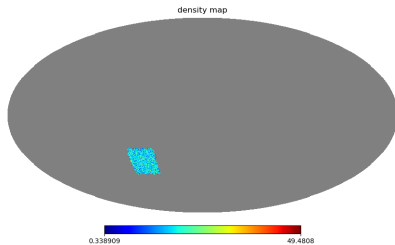
~~LM~~ IJCLab

November 7, 2018

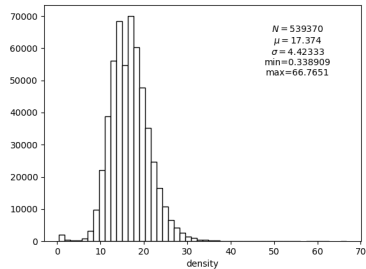
Catalogs

- TRUE: OuterRim (HACC)+ UniverseMachine+Galacticus
=galaxies : **CosmoDC2**
- REC: +stars+transients+imSim+Stack: **Object Catalog** (run2.1)

TRUE

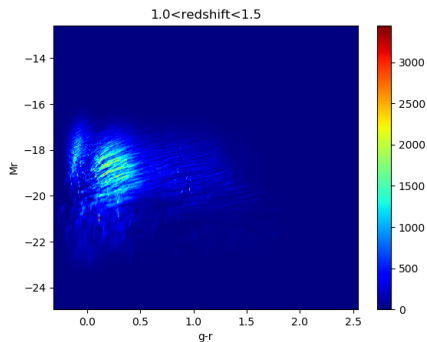
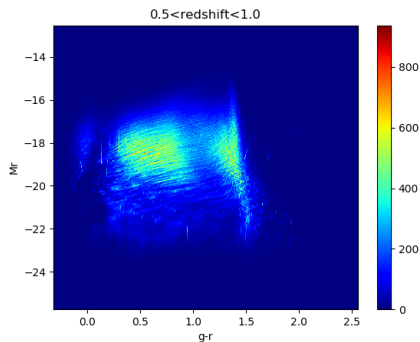


440 deg²



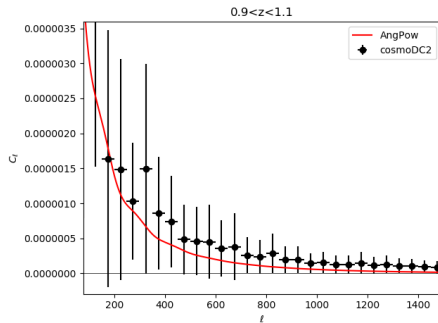
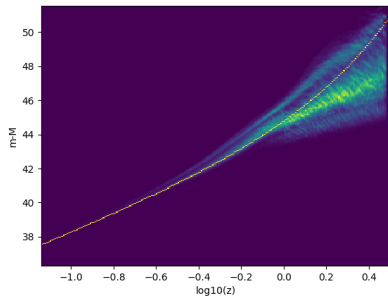
HSC ($24 < i < 25$):
 $N(< i) = 40.10^{-0.36(25-i)} / \text{arcmin}^2$

TRUE: color-mag



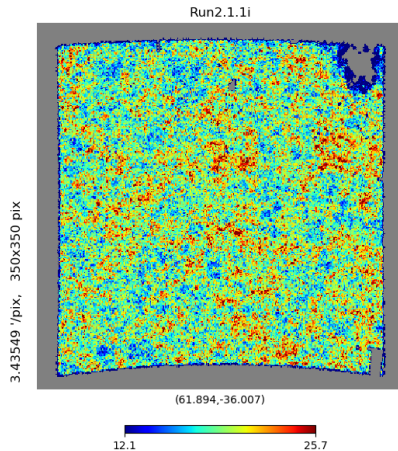
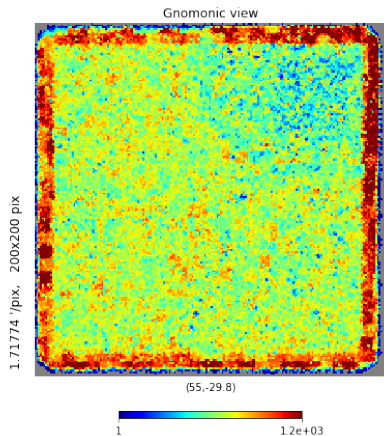
Galacticus interpolation

TRUE: cosmology

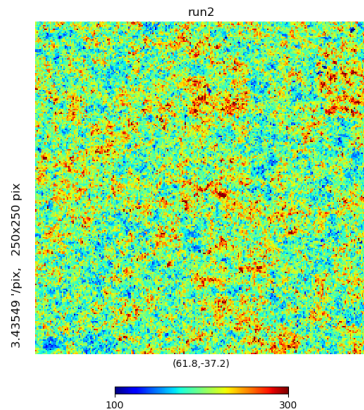
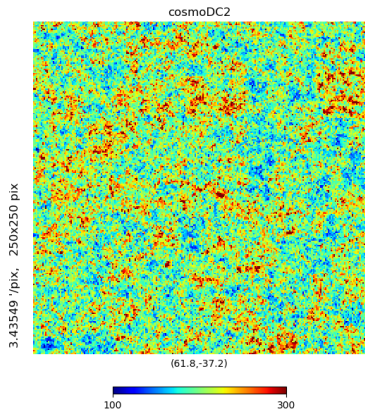


REC

Run 1.2:

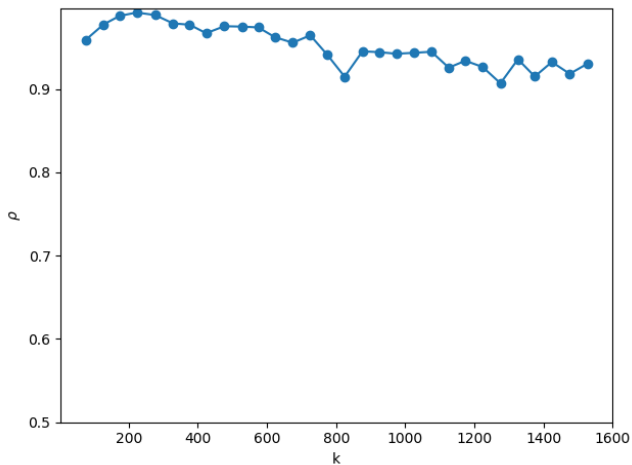


REC vs TRUE



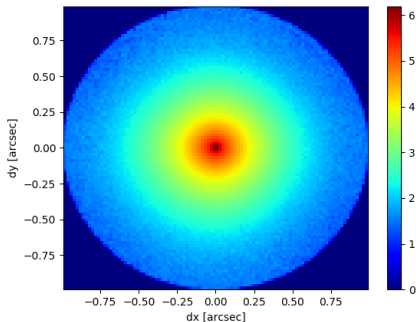
constant offset subtracted

cross-correlation



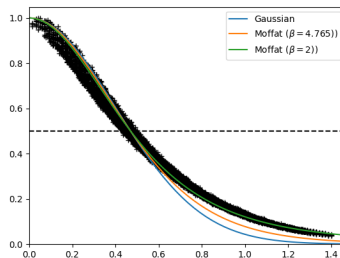
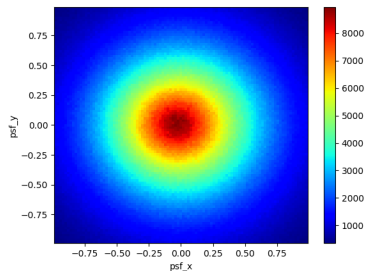
crossmatch(REC,TRUE)

- associate pairs if $r_{ij} < 1$ arcsec (astrometric precision better than that). keep *single match* candidates.
- $\simeq 100M \times 100M$: 3 mins with Spark, $O(hr)$ standard ways.
- completeness ($i < 25.3$) : 85% (95% single matched), contamination $< 0.5\%$



Checking the (mean) PSF

$$PSF_{x,y} = \Delta_{x,y} \cdot SNR / \sqrt{2}$$

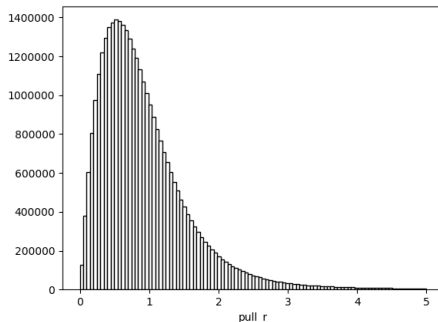


REC: mean(FWHM)=0.9 arcsec

Checking the PSF FWHM

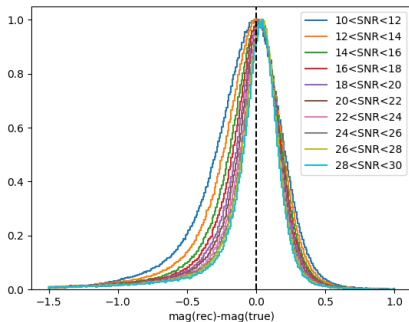
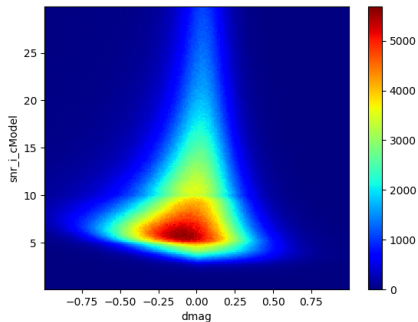
$$PSF_r = \sqrt{\Delta^2 + \Delta y^2} SNR / \sqrt{2} \sim 2\pi r \mathcal{M}(r, \beta = 2)$$

pull distribution $\frac{PSF_r}{psf_fwhm}$ should peak at 0.44

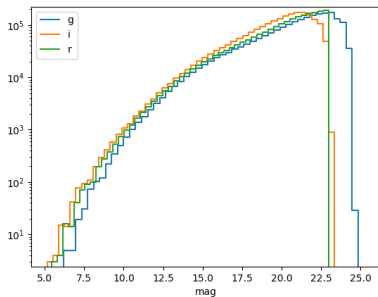


0.52 → astrometry OK.

Photometry (galaxies)



Stars



from Marc:

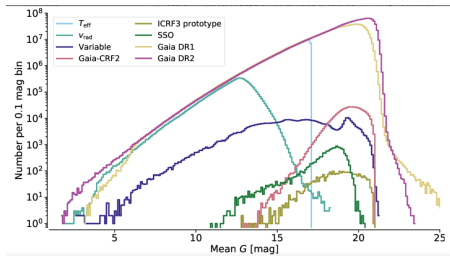
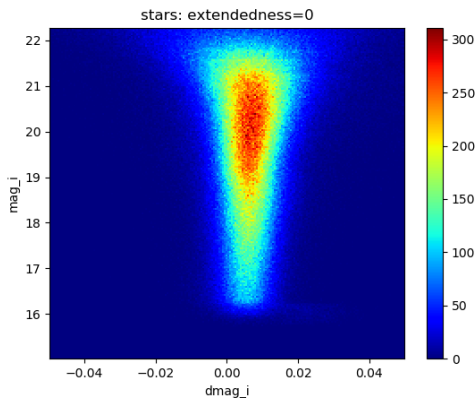


Fig. 1. Distribution of the mean values of G for all Gaia DR2 sources shown as histograms with 0.1 mag wide bins. The distribution of the Gaia DR1 sources is included for comparison and illustrates the improved... [Continue Reading](#)

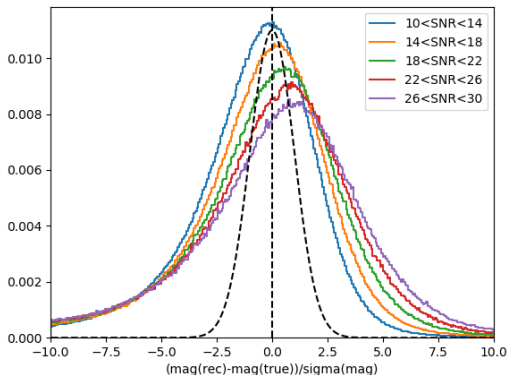
PSF Photometry (stars)



8 mmag bias (colors OK) → investigations + corrections for Run2.2

Photometric errors

$$\text{pull} = \Delta \text{mag} / \sigma(\text{mag}):$$



wrong by a factor $\simeq 3$.

Conclusion

- **CosmoDC2** : very complete galactic survey (440 deg^2).
Magnitudes positions (lensing) OK (some interpolation issues).
shapes?
- Run2.1 **Object Catalog** much improved: astrometry OK,
photometry 8 mmag shift+mageror $\rightarrow$ run 2.2
- technical discussions on slack channels (cumbersome)
- why am I the only one doing such basic tests?
- all performed *interactively* with Spark at NERSC.
- would be more efficient at cc
- **CosmoDC2-5000** planned: will not scale. systematics analysis
requires many passes.