Investigating Cluster Detection Limit with Weak Lensing

Zhuoyi Huang

DUEL PhD (INAF-OAC, Naples)

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Outline

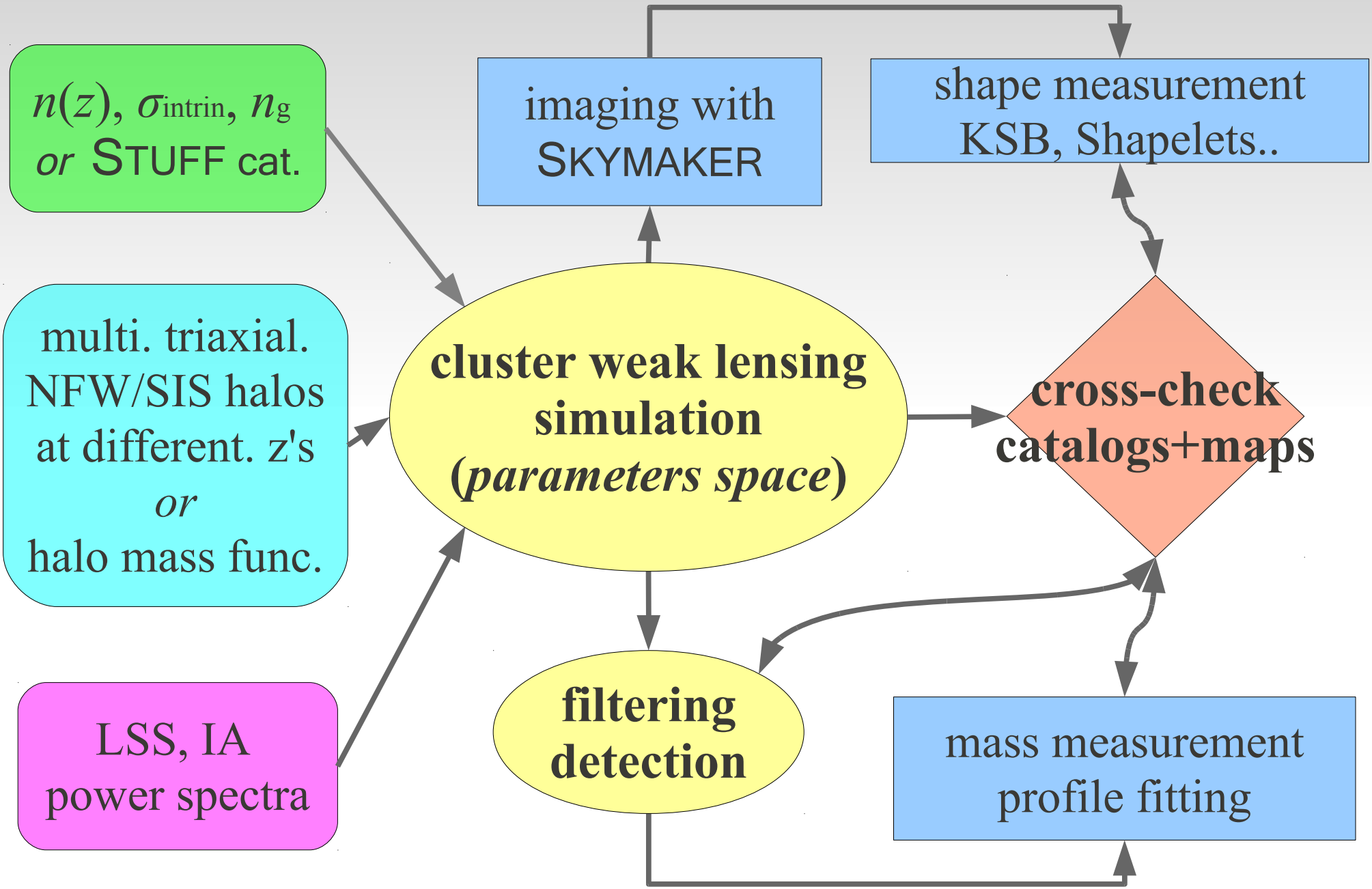
- The noise in cluster detection with weak lensing
- Calibration tools I. simulation of cluster weak lensing
- Calibration tools II. filtering detection
- Real data application
- Outlook

A list of uncertainties

- shape measurement, PSF correction
- redshift distribution of source galaxies
- intrinsic ellipticity dispersion of source galaxies
- large scale structure as noise (for less massive clusters)
- intrinsic alignment as noise (for low-z clusters)
- lens properties (target)

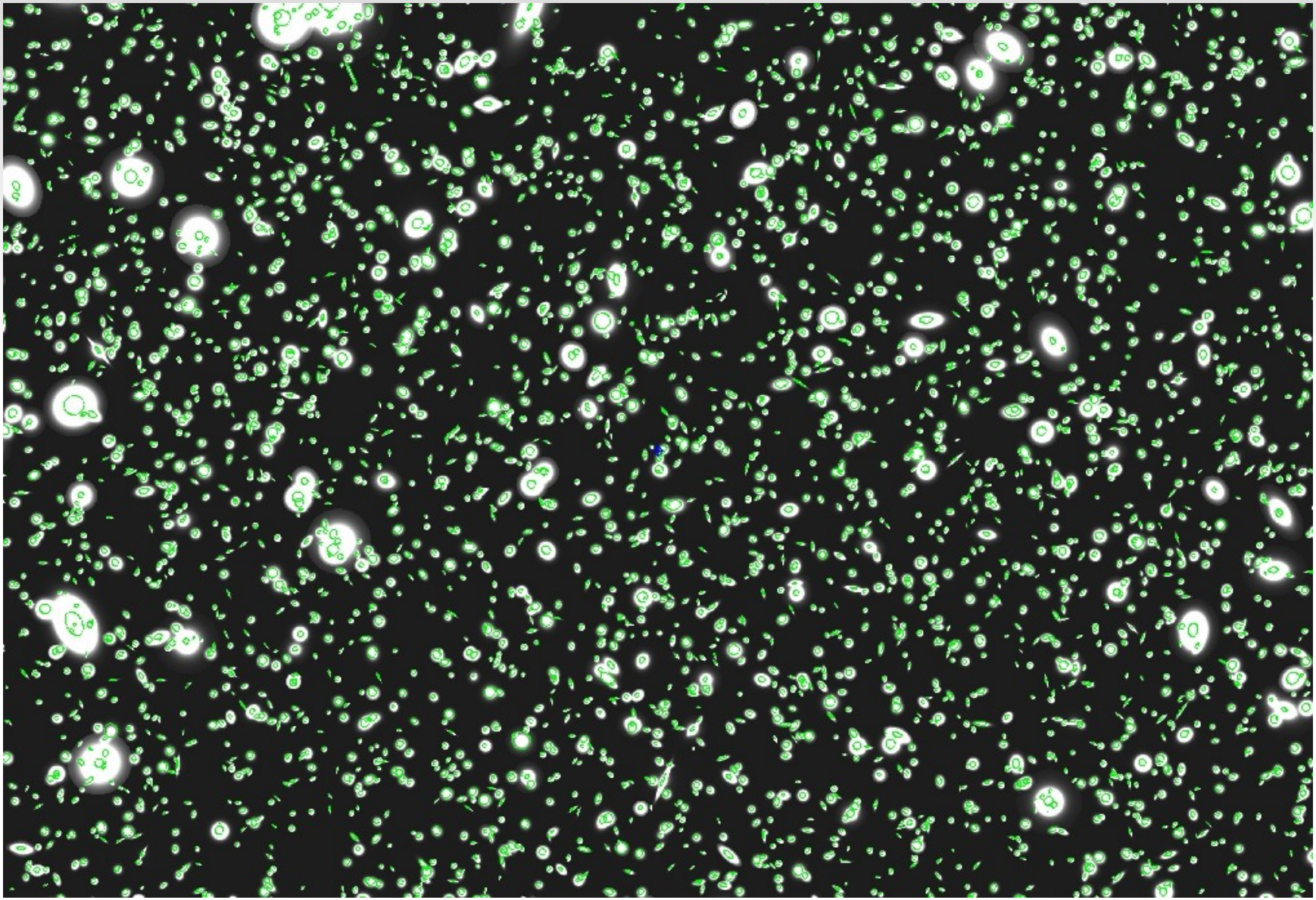
A non-trivial limit of GCl detection with WL

A set of calibration tools



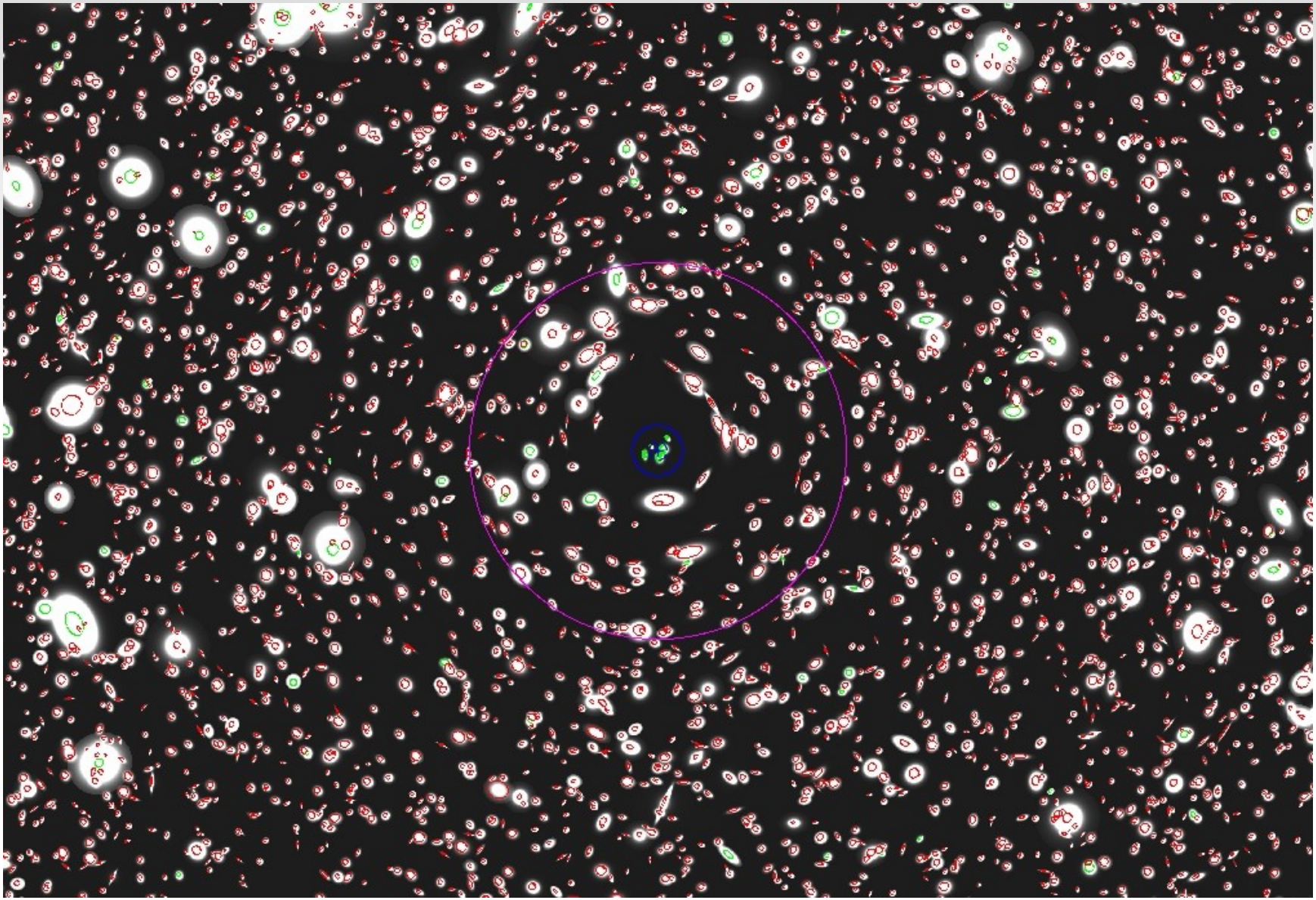
simulation examples

STUFF simulated catalog. (9'x6') *n*=30/sq.'



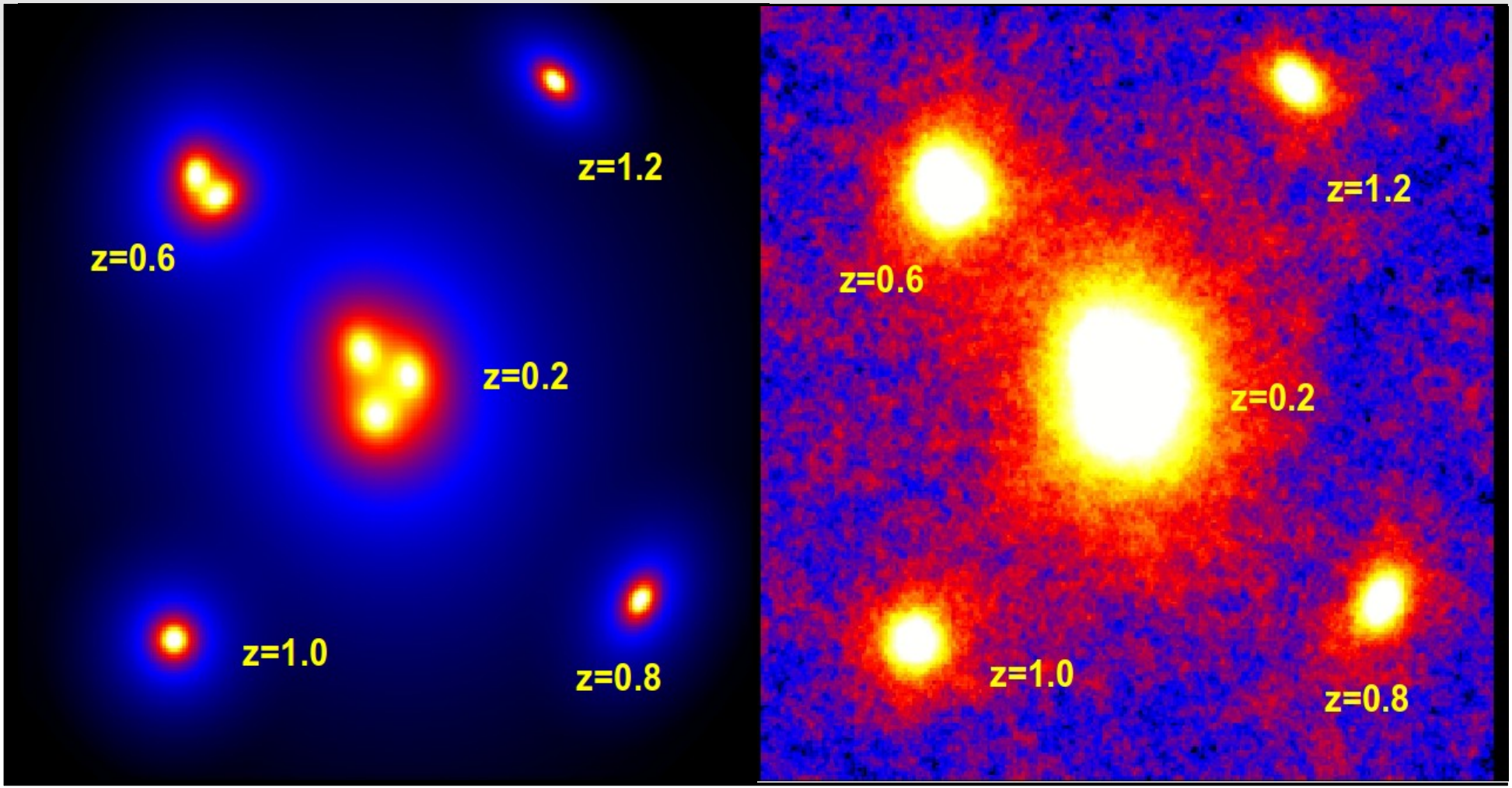
simulation examples

single NFW halo z=0.2 (M=10M* c=6.0)



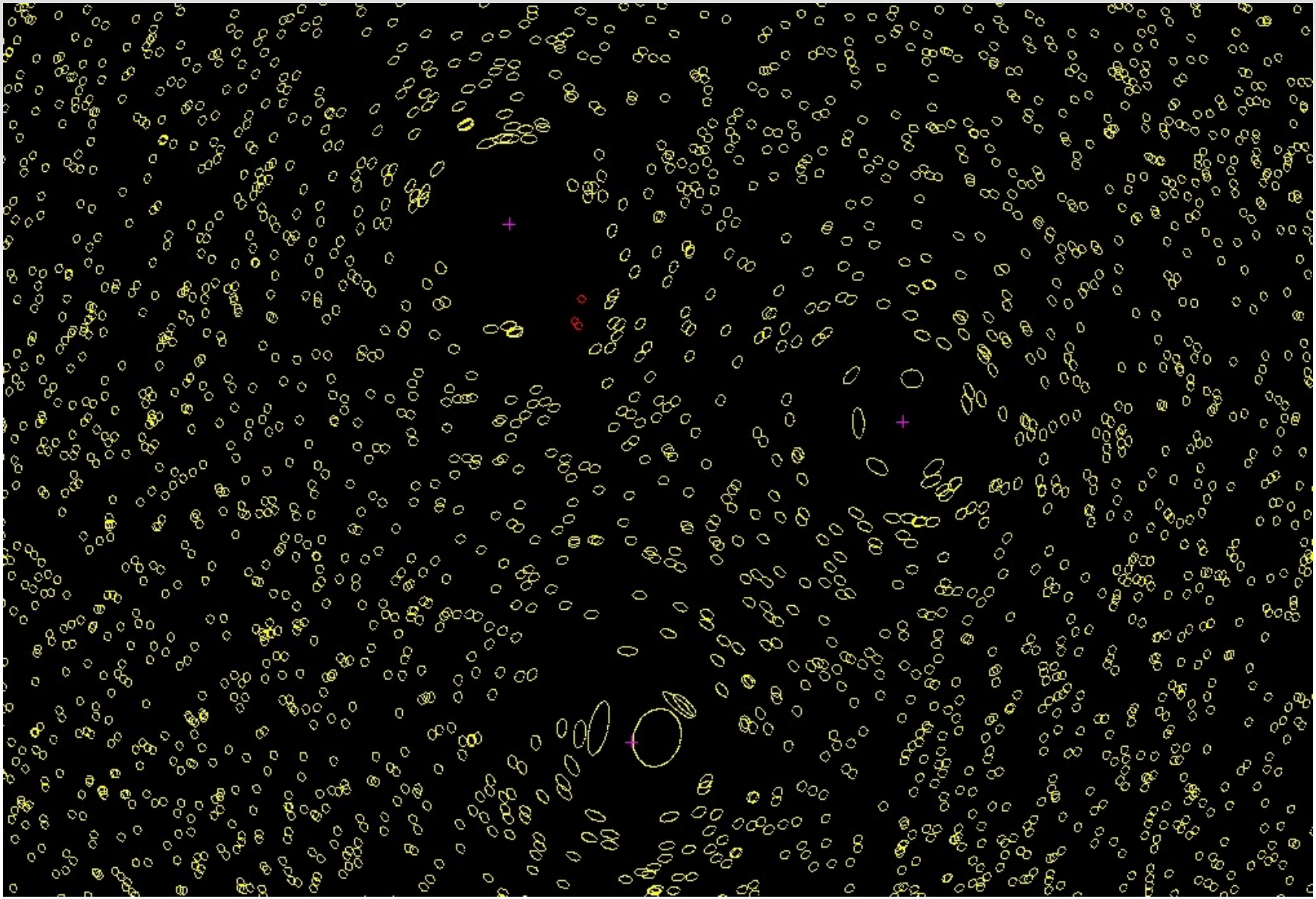
simulation examples

proj mass map of 5 NFW halos **+ proj. LSS (Gaussian) z=0~2**



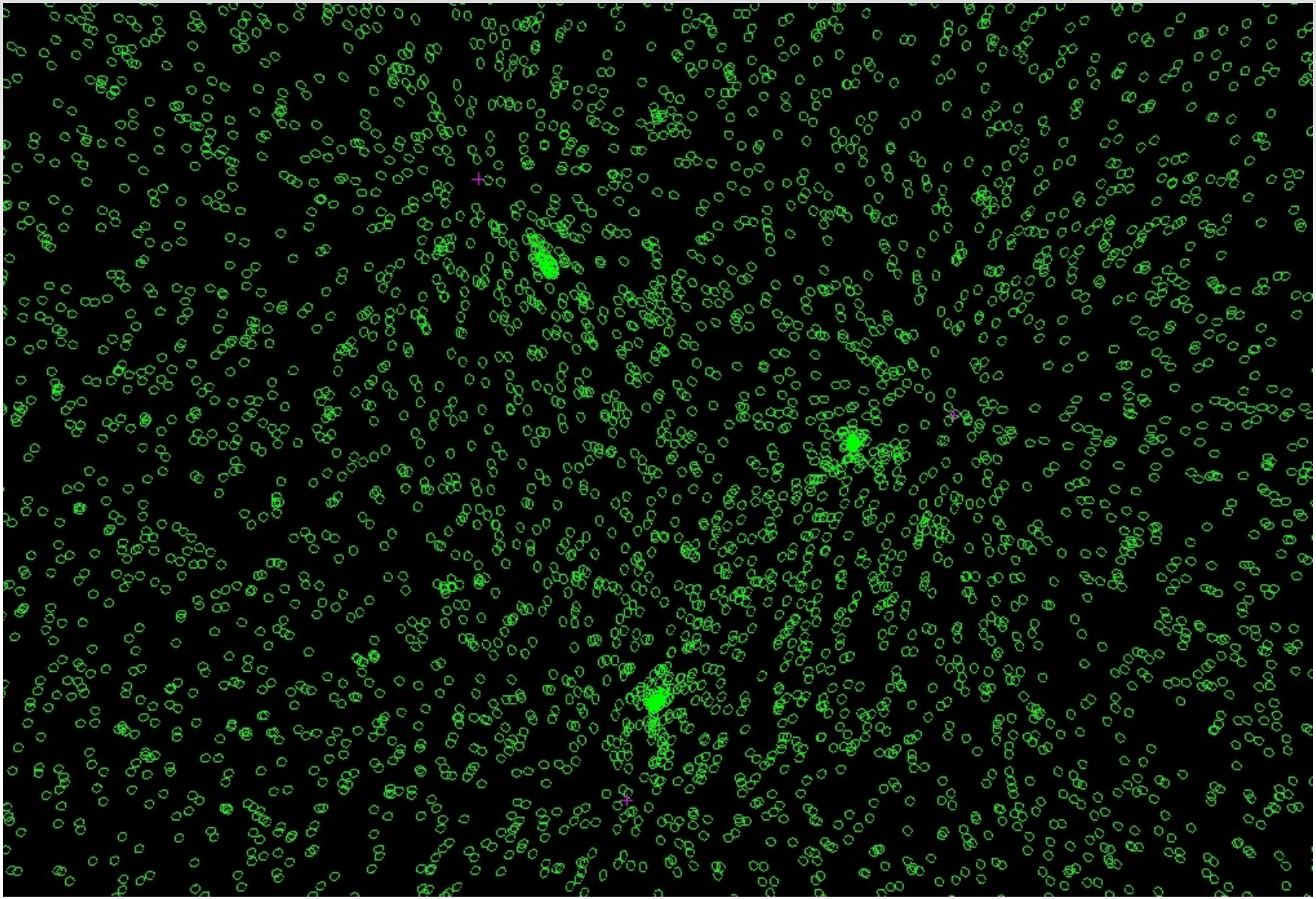
simulation examples

zoomed halos at z=0.2 (background galaxies z=2.0 intrinsically circular)

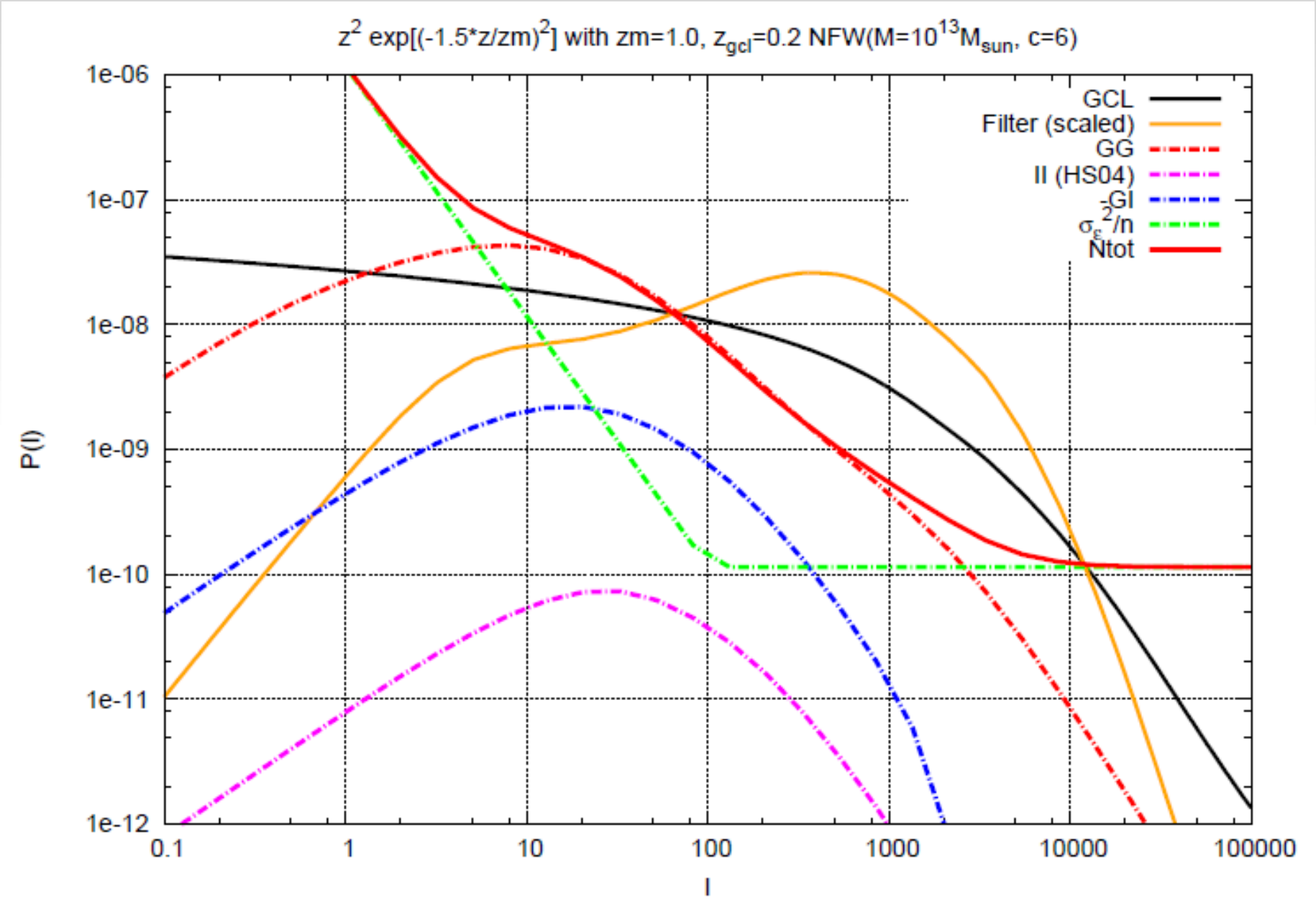


simulation examples

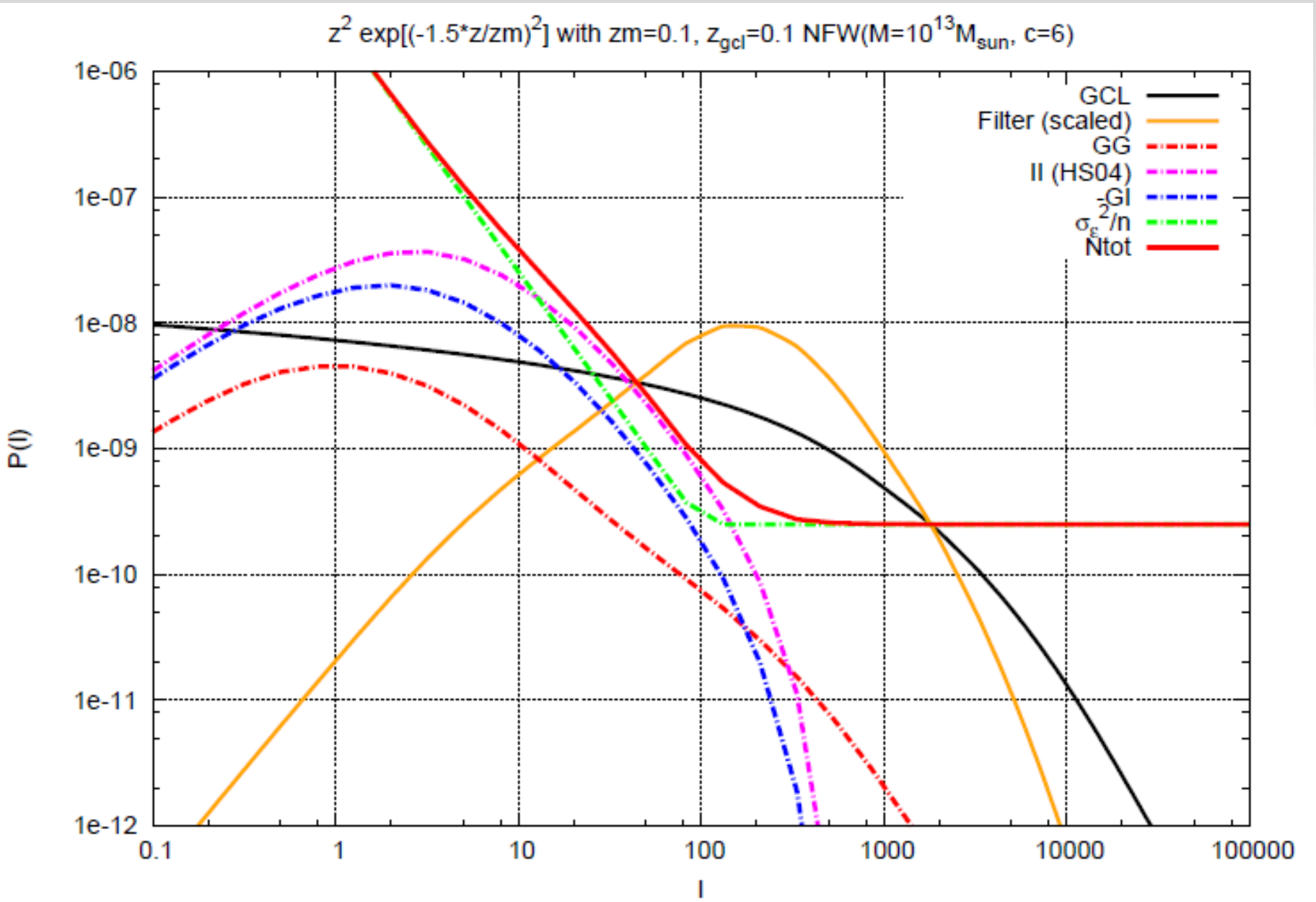
zoomed halos at z=0.2 (local galaxies zs~0.2 intrinsically circular)



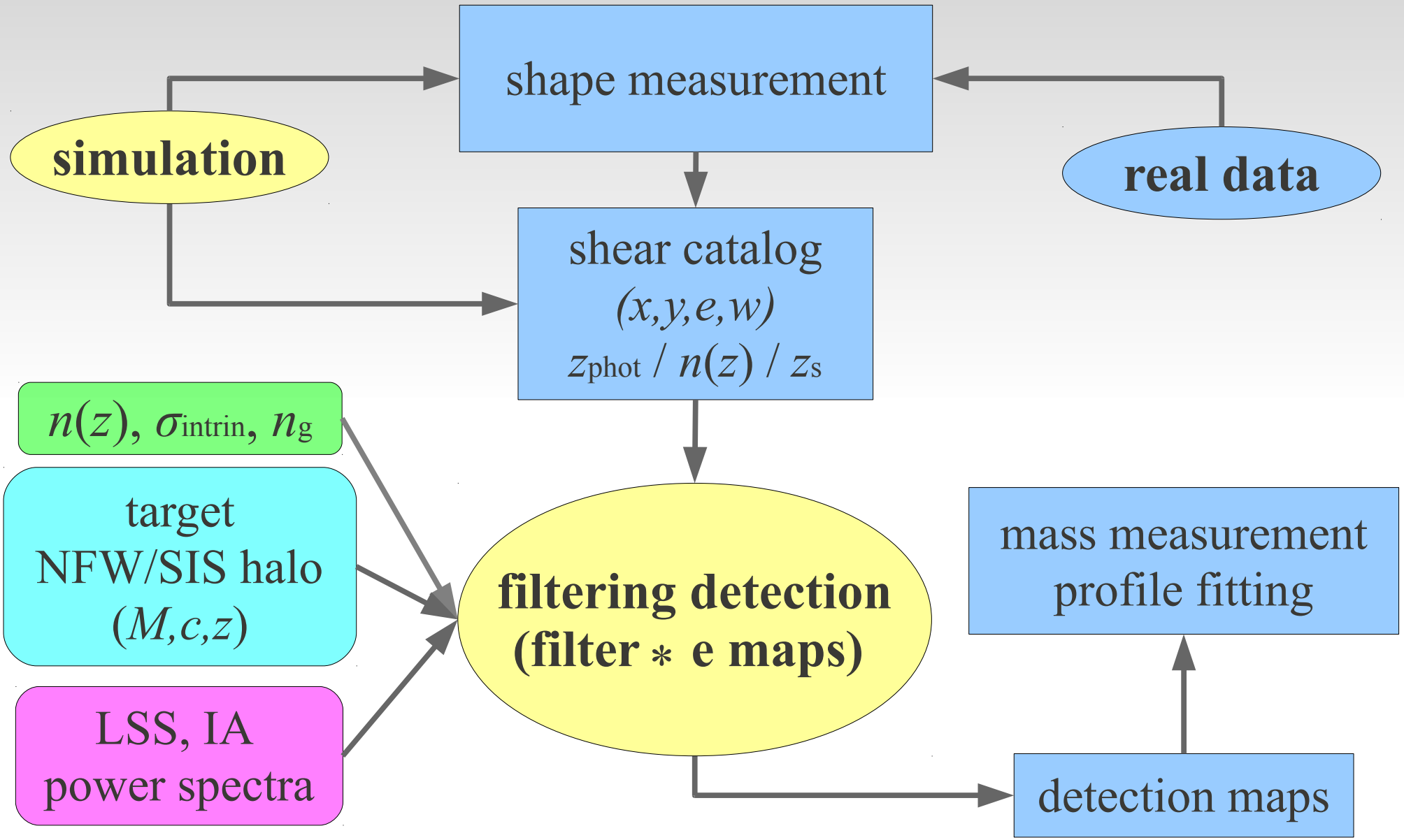
filtering detection (Maturi *et.al.* 2005, Pace *et.al.* 2007)



filtering detection

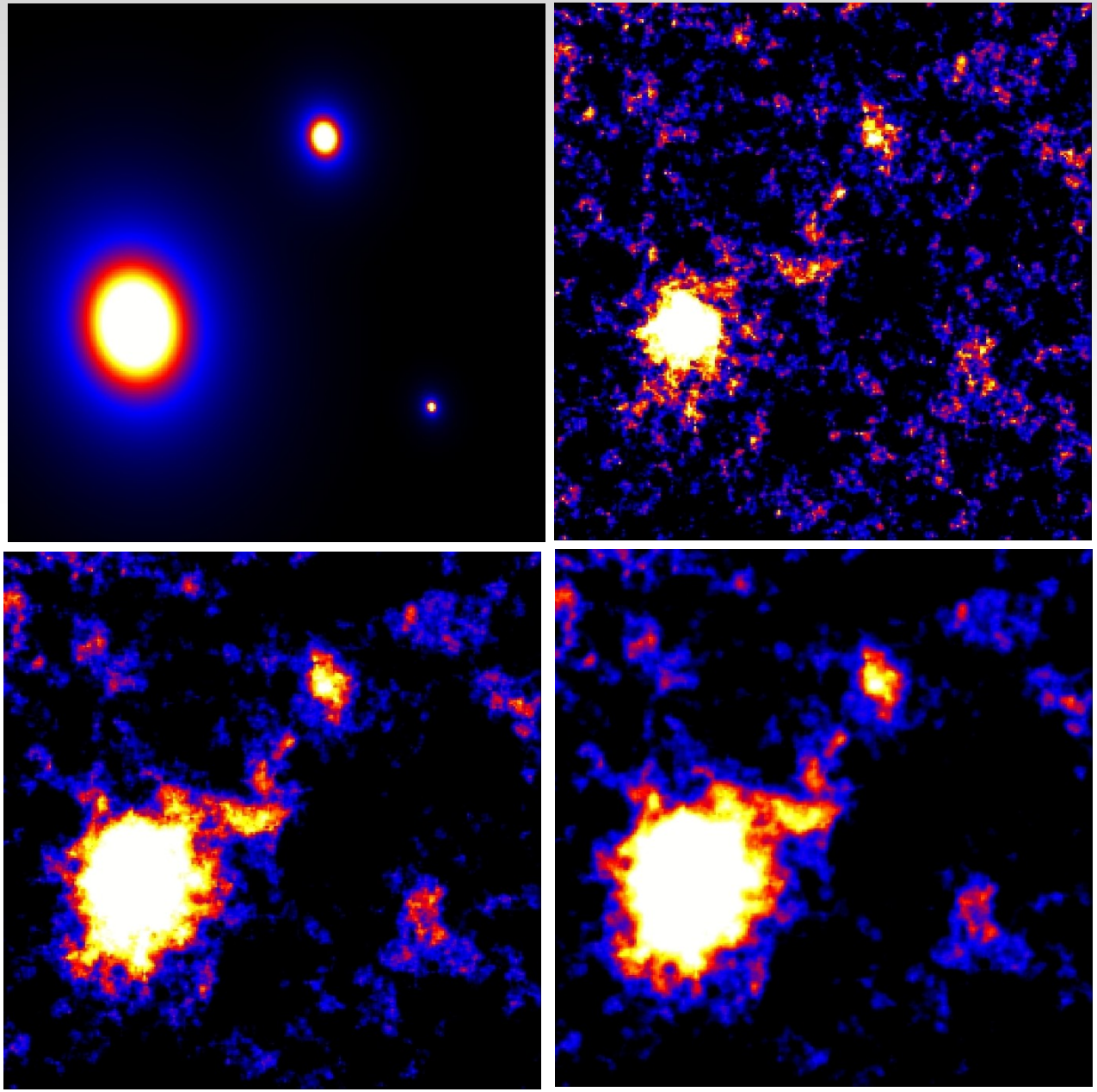


A set of calibration tools



detection examples

proj. mass
z = 0.2
M/M* =
(10,1.0,0.1)



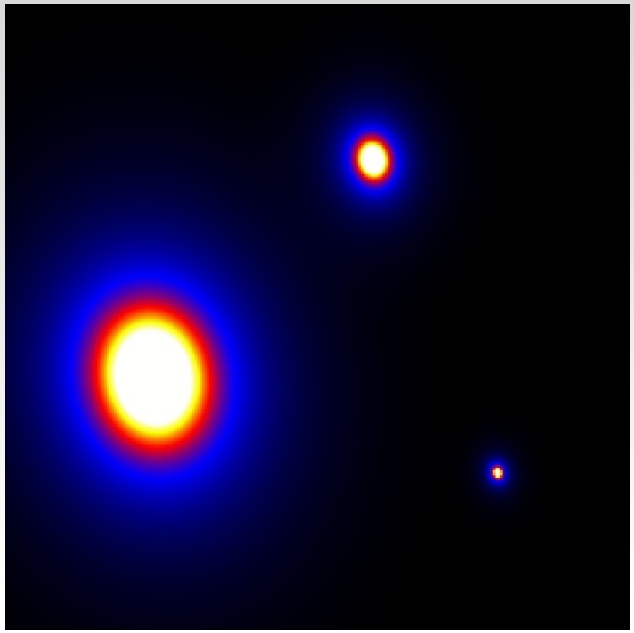
M/M* = 0.1

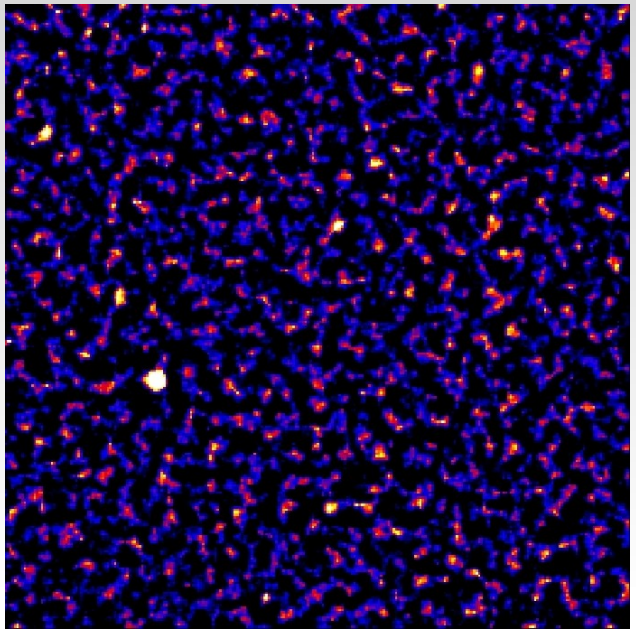
M/M* = 1.0

M/M* = 10

detection examples

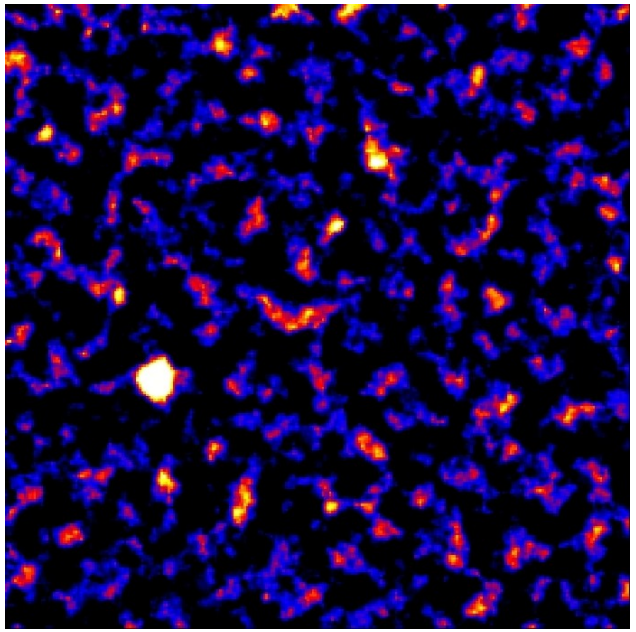
proj. mass
z = 0.2
M/M* =
(10,1.0,0.1)

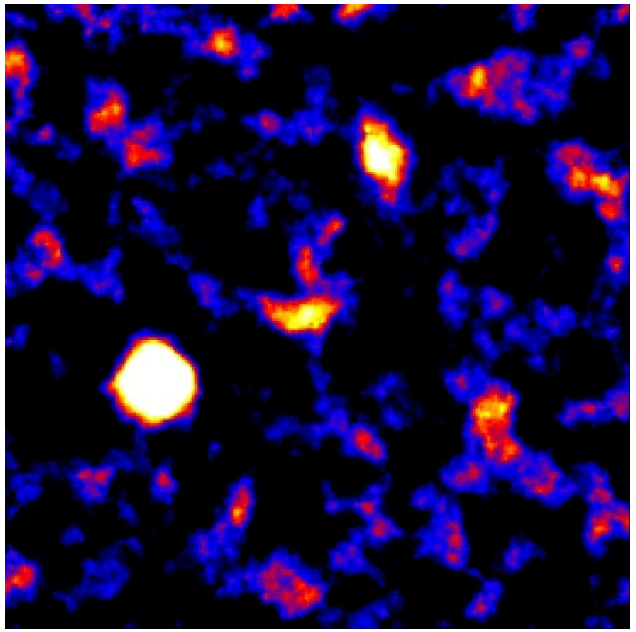




Gaus. 1'

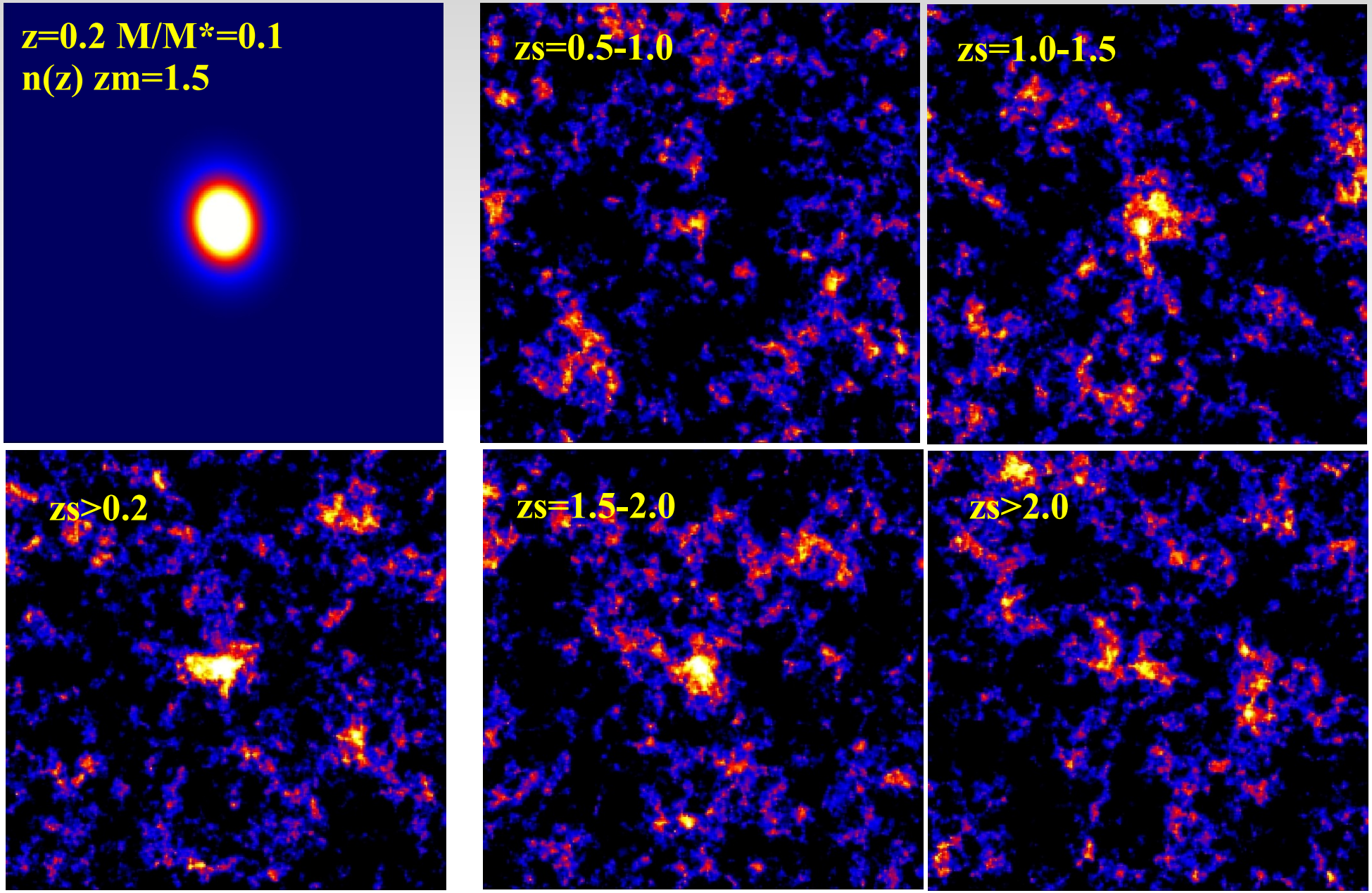
Gaus. 2'





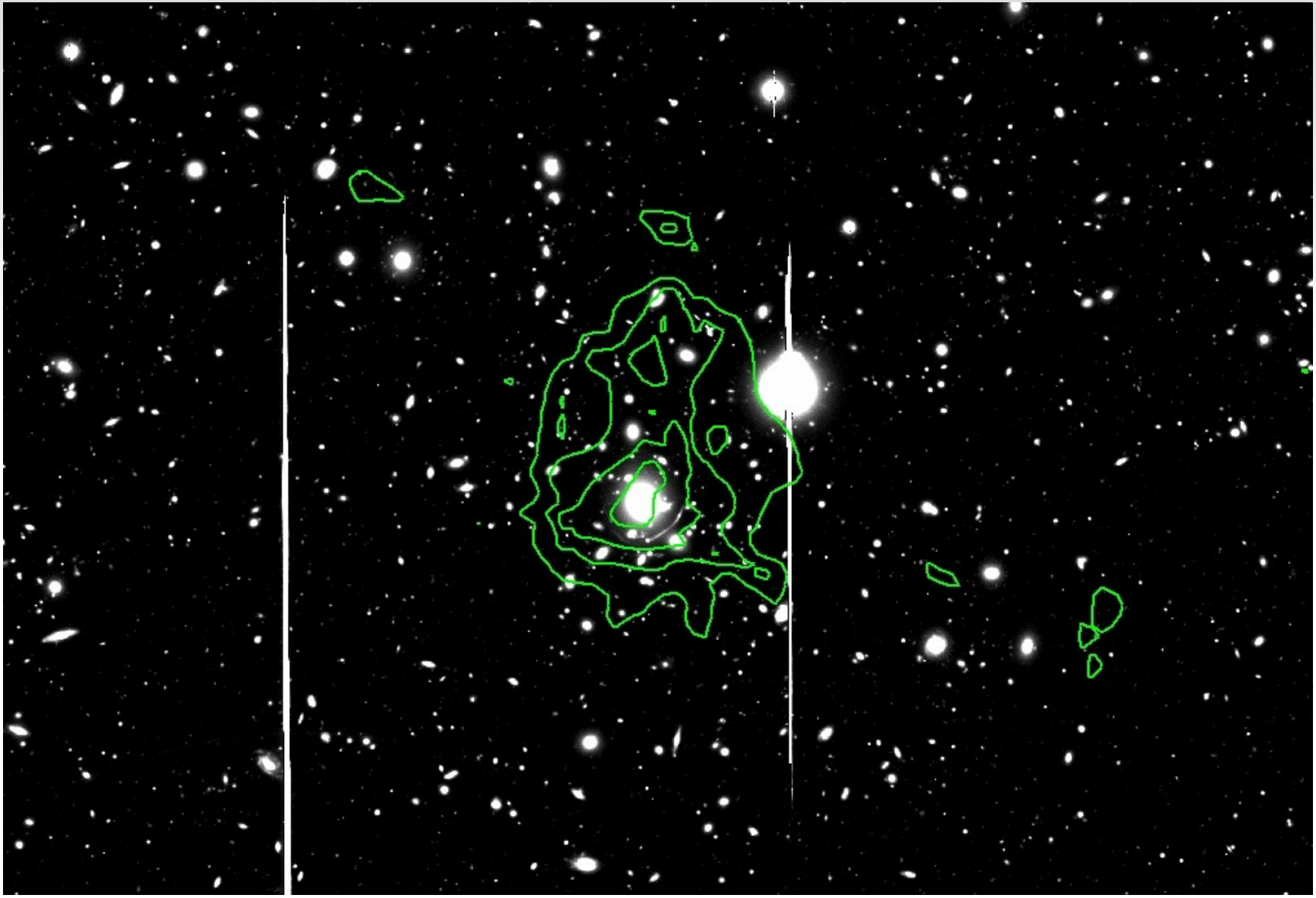
Gaus. 4'

detection examples



real data application

A383@Subaru center (9'x6') 24 gal./sq.'; S/N = 3~7



Outlook

- Implement halo distrib. from halo mass function
- The projection effect in detection (halo impact cross-section)
- detection limit → practical halo number counts from WL
- more cluster data (Subaru, LBT)
- comparison with color selection, X-ray