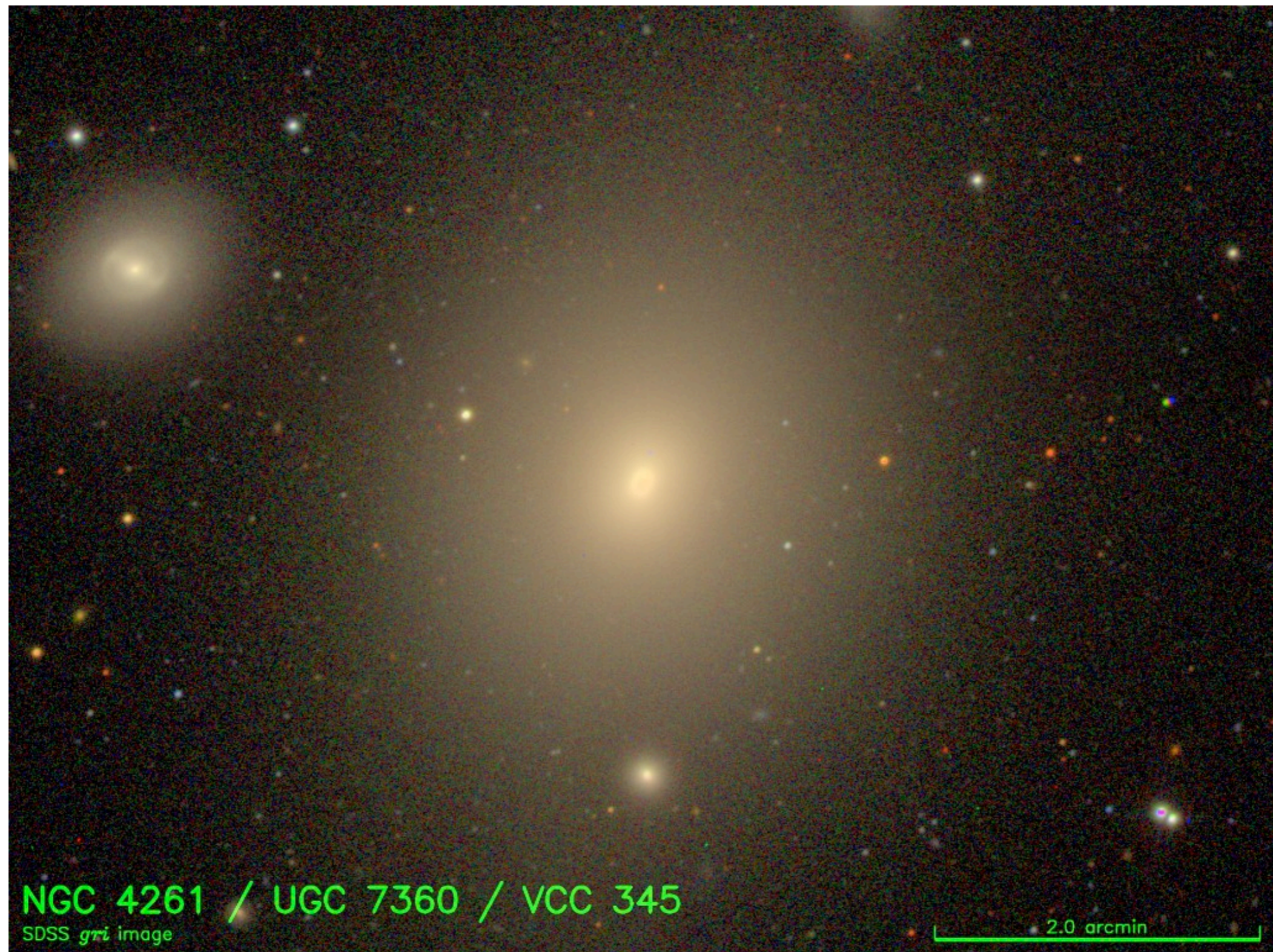


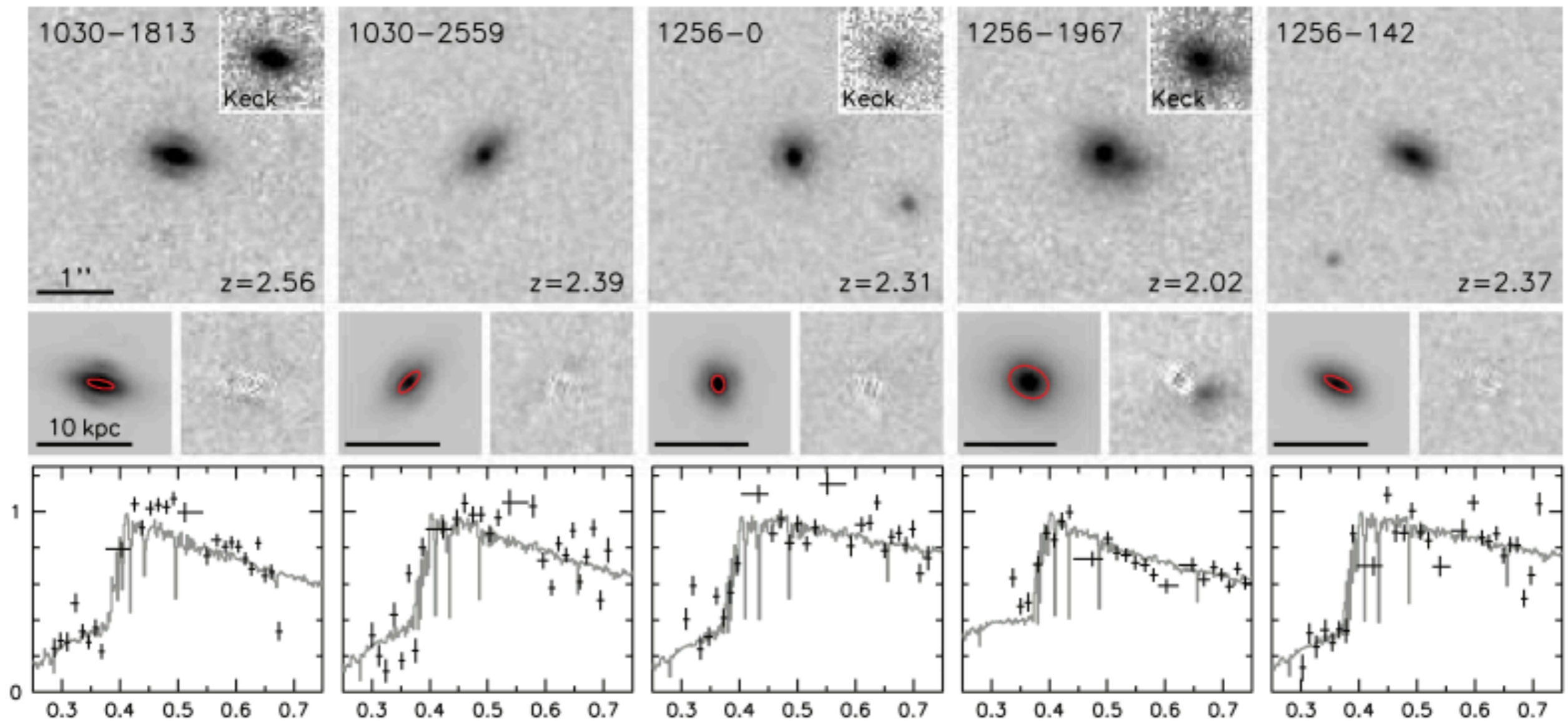
Scaling Relations and Size Evolution in Early-type Galaxy Populations

Brad Holden (UCO/Lick Obs)
Garth Illingworth (UCO/Lick Obs)
Arjen van der Wel (MPIA)
Daniel D. Kelson (Carnegie Obs)
Marijn Franx (Leiden Obs)
Shannon Patel (Leiden Obs)



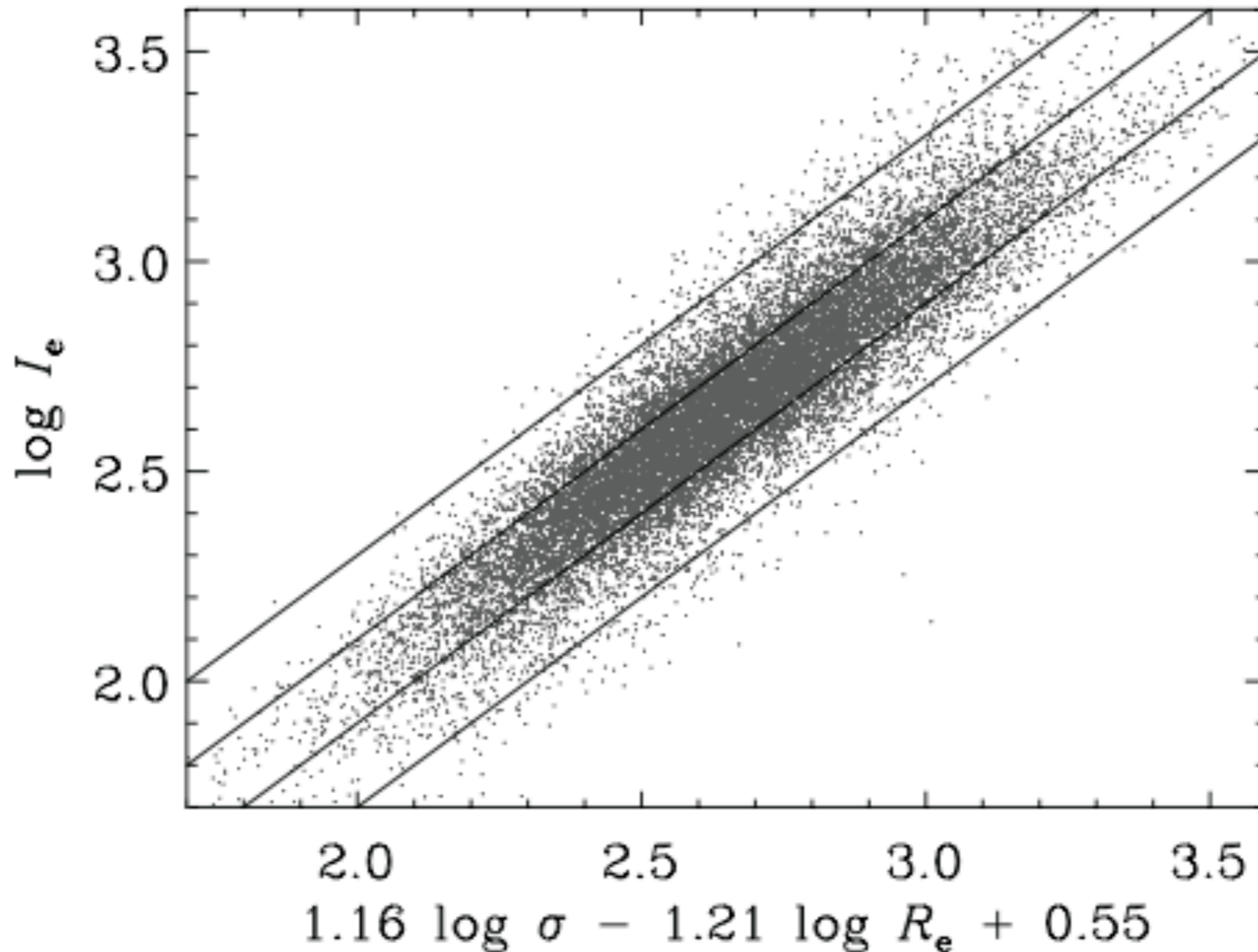
David W. Hogg, Michael R. Blanton, and the Sloan Digital Sky Survey Collaboration

Early-types at $z \sim 2$



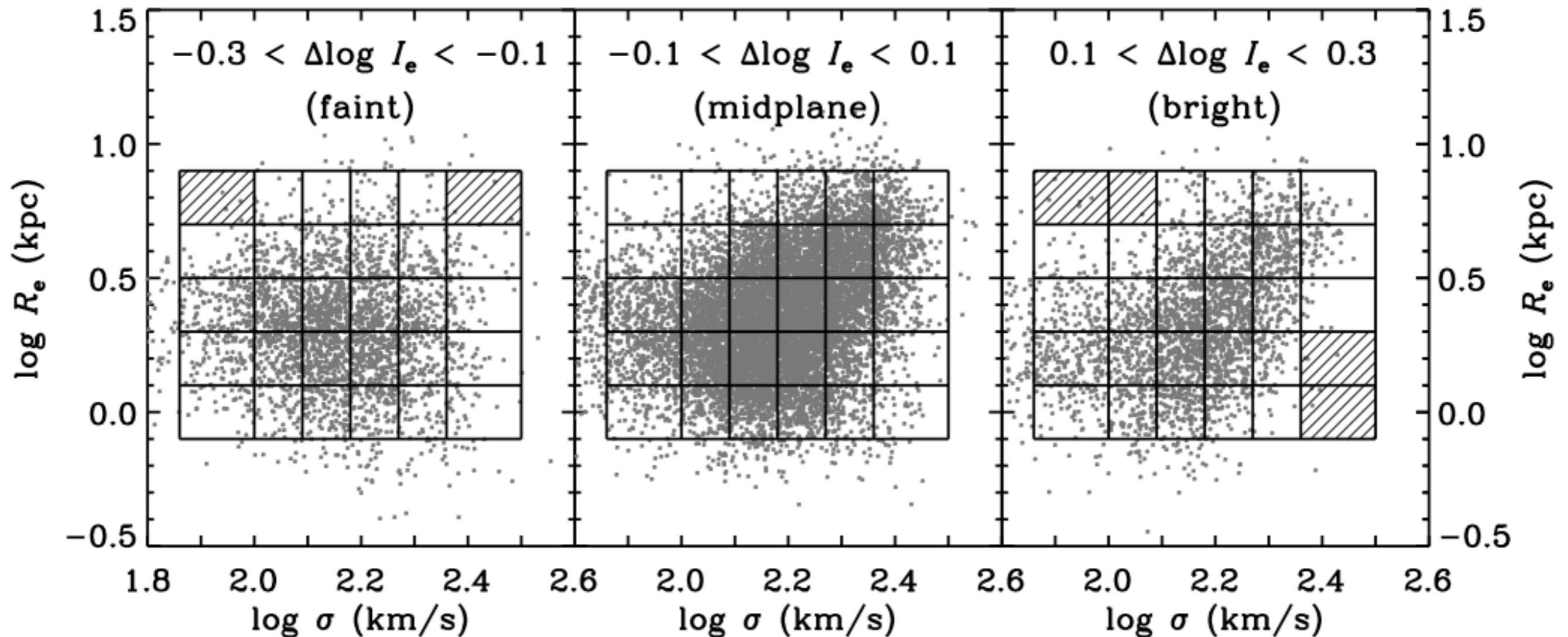
van Dokkum et al. (2008)

Classic Scaling Relations



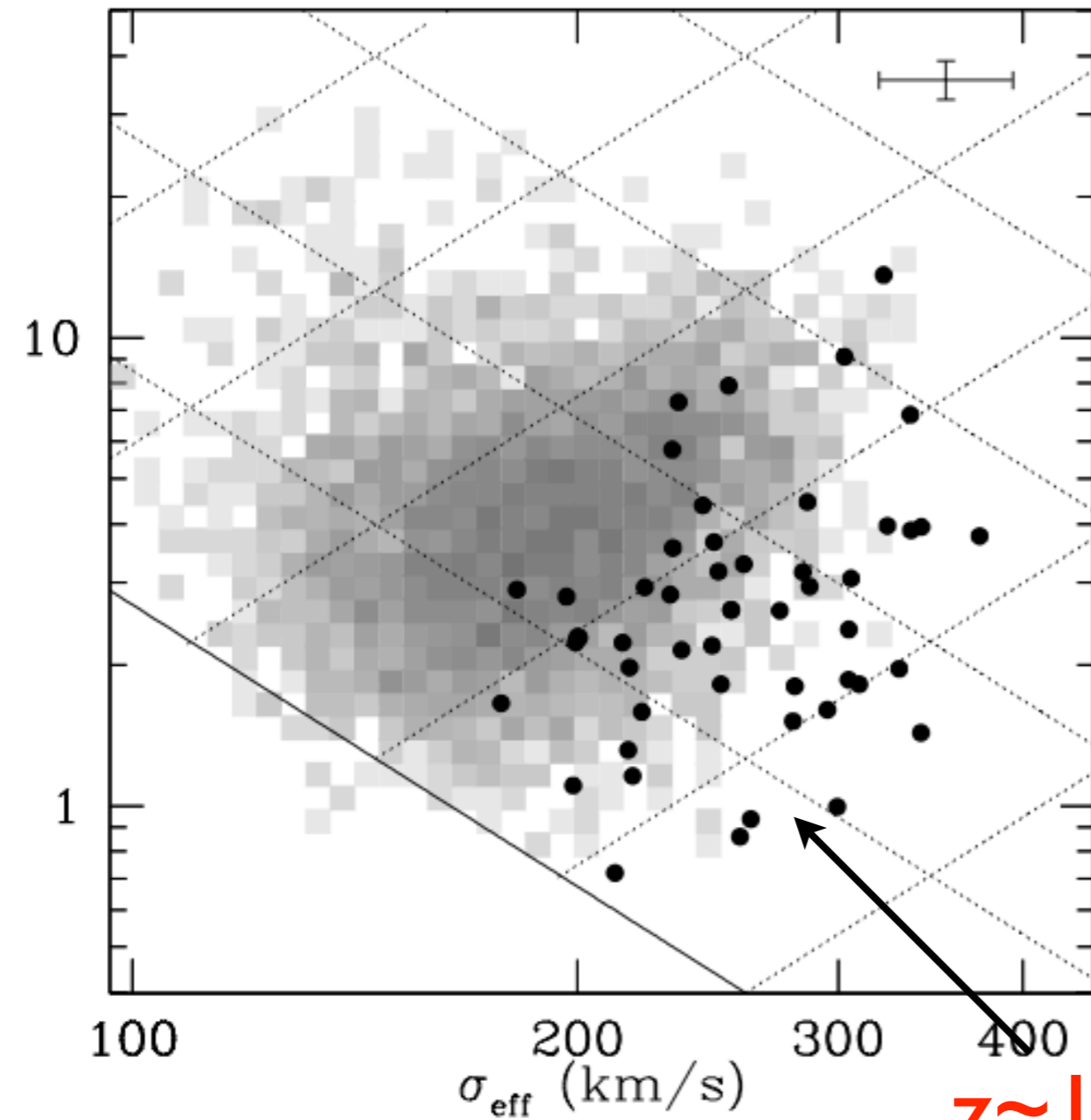
Graves et al. (2009)

Classic Scaling Relations



Graves et al. (2009)

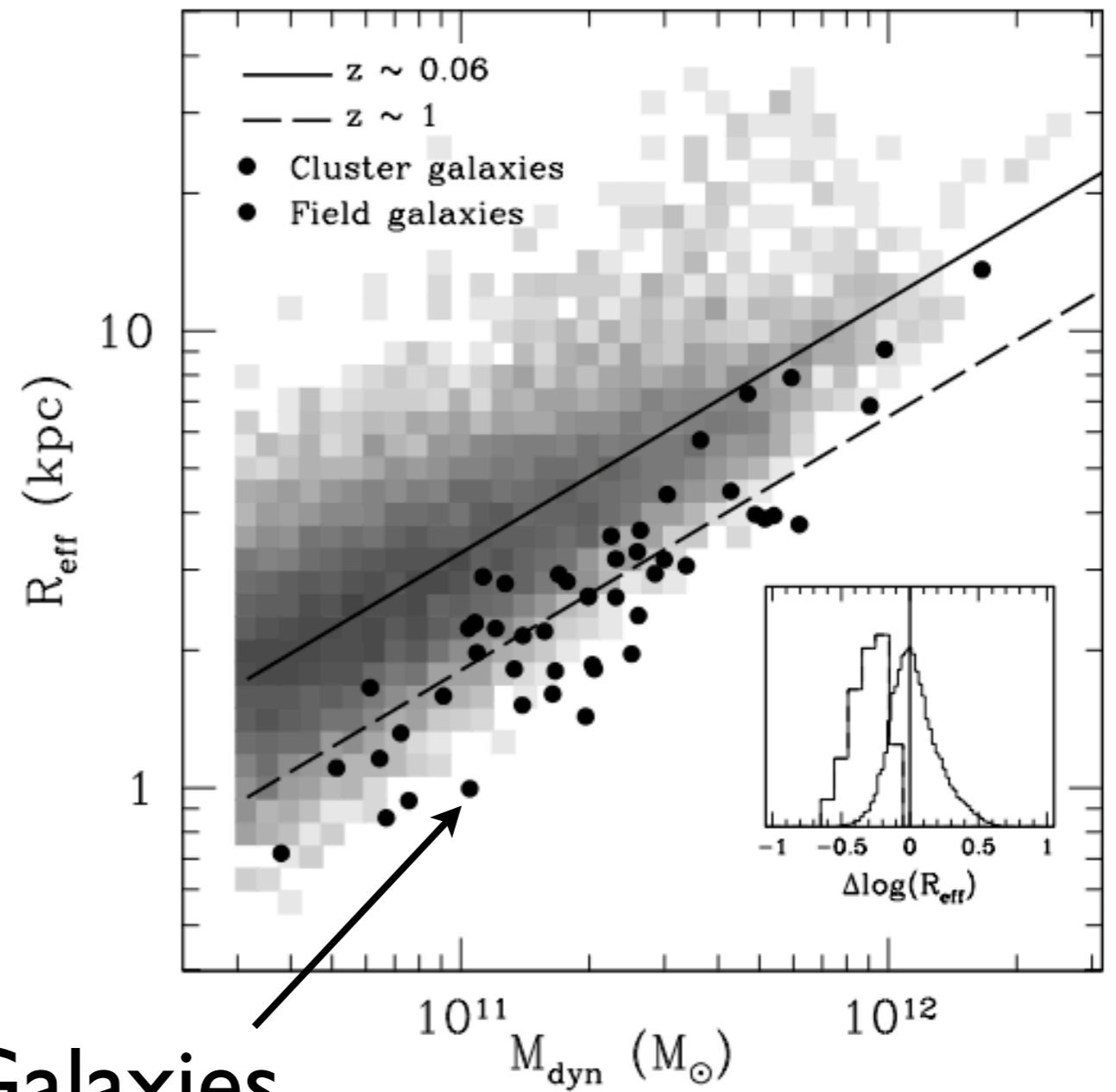
Classic Scaling Relations



$z \sim 1$

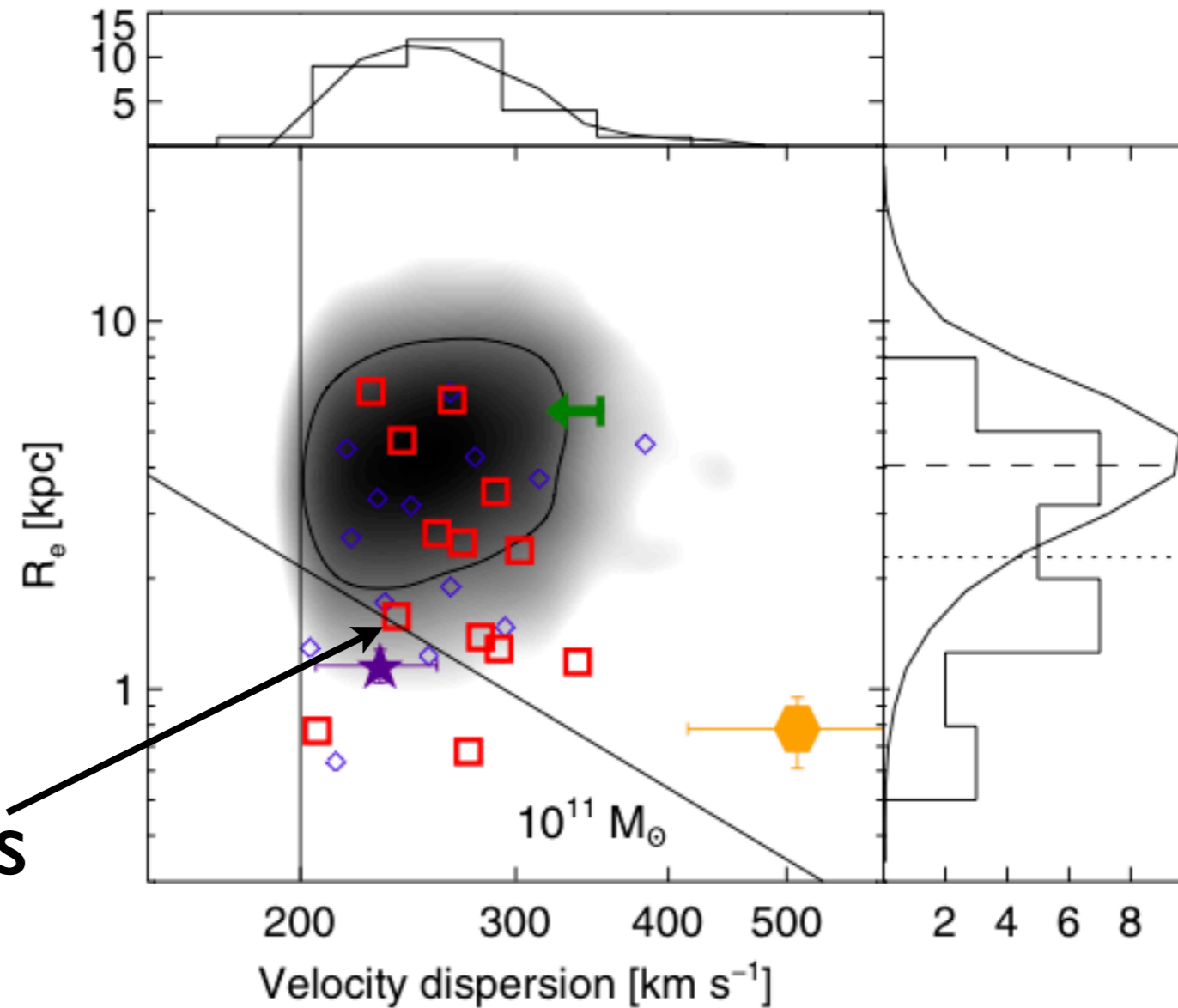
Galaxies

van der Wel et al. (2008)



Galaxies

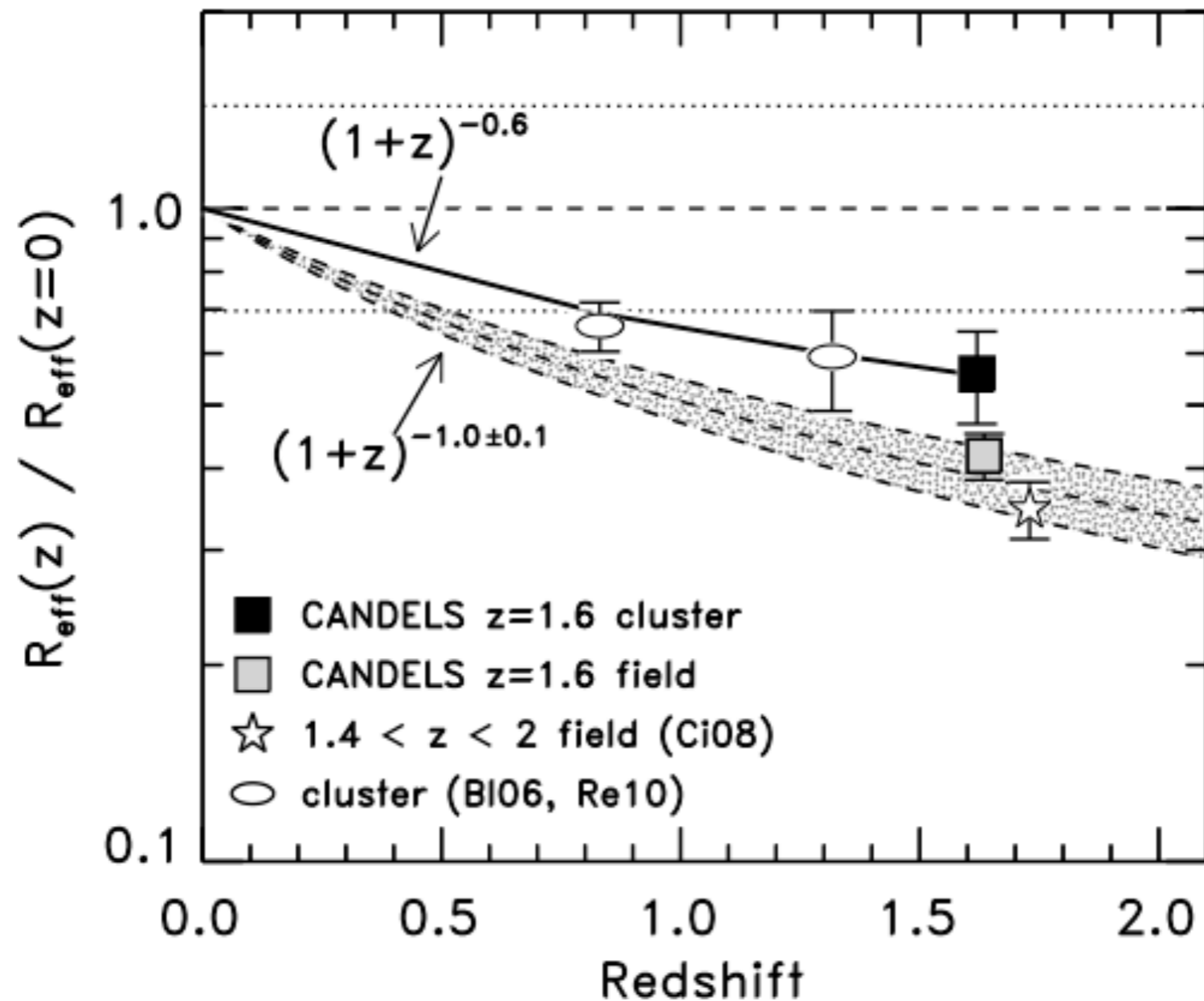
Classic Scaling Relations



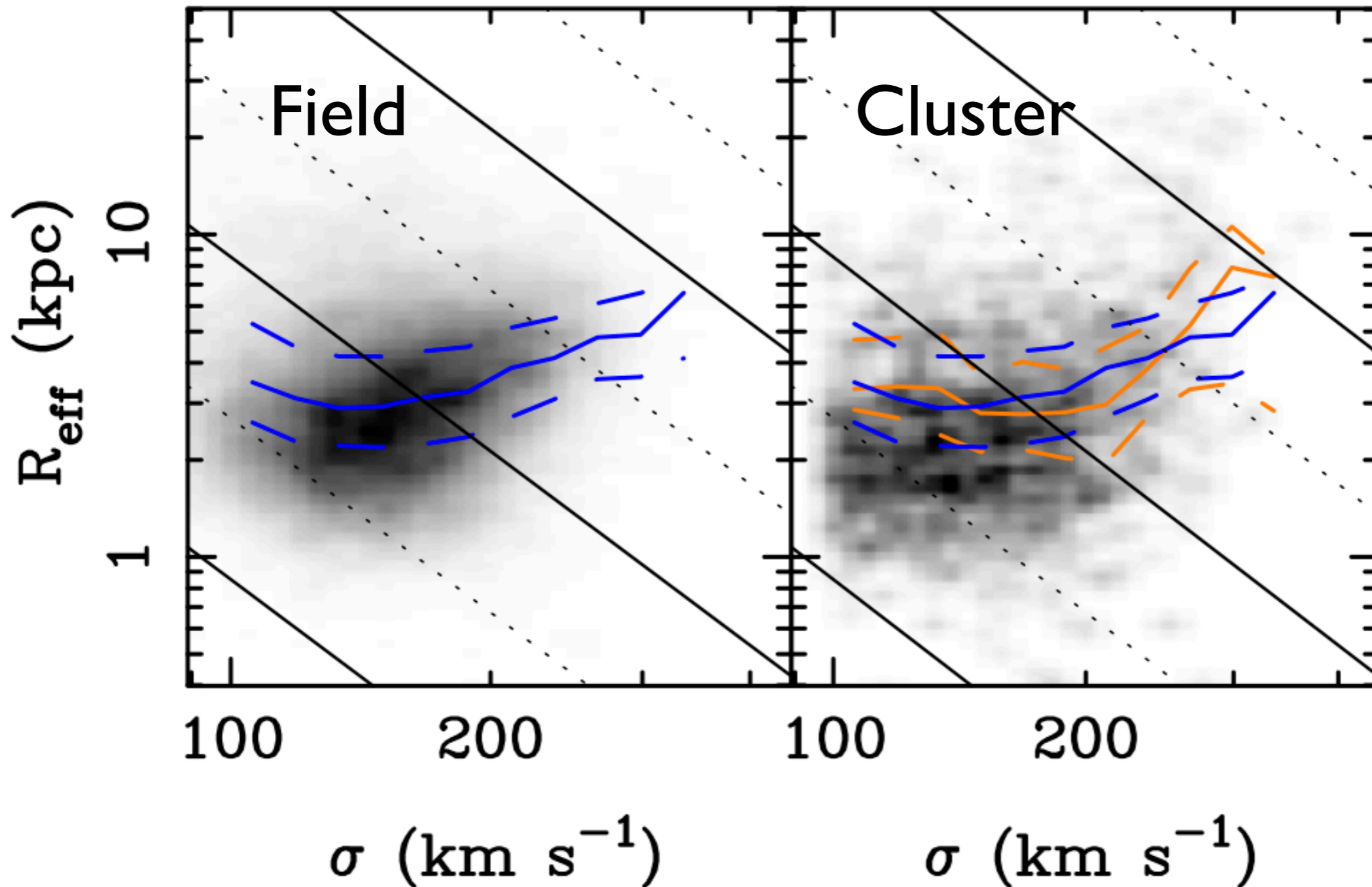
$z \sim 1.6$ Galaxies

Newman et al. (2010)

Field and Cluster Size Evolution



Cluster Galaxies are Different at $z=0$

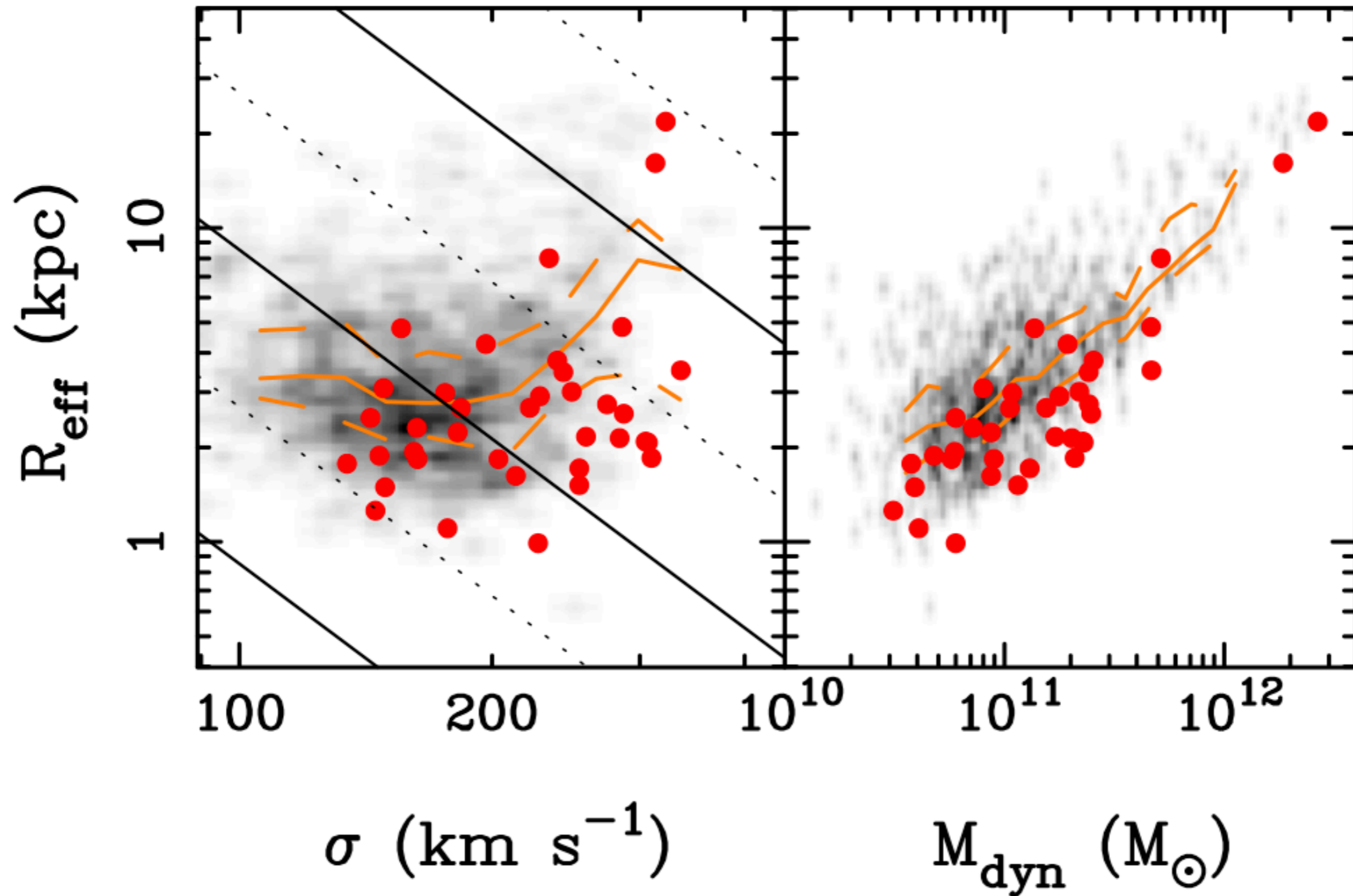


NOAO FP
Smith et al.
(2004)

see also:
Valentinuzzi
et al. (2010)

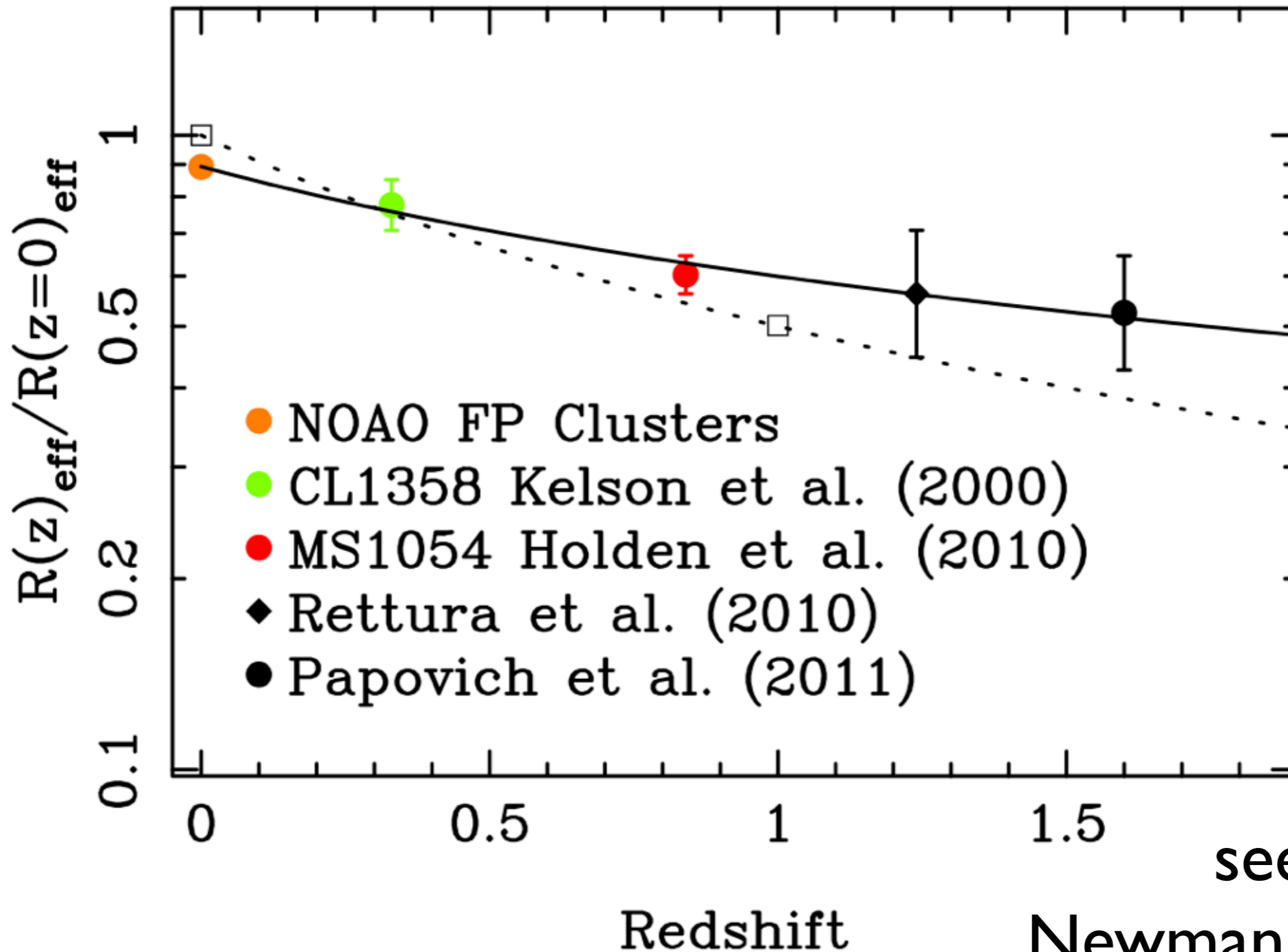
Blue - Field SDSS Galaxies **Orange** - Clusters NOAO FP

There is Size Evolution



Orange - Clusters NOAO FP Red - $z=0.8$ Cluster

Cluster Galaxy Size Evolution



see also:

Newman et al. (2010)

Size Evolution from $z \sim 1$ to 0

- At a fixed dispersion, or stellar mass, passively evolving galaxies are smaller in the past.
- Cluster galaxies are slightly smaller, today, than field galaxies of the same dispersion.
- The pace of evolution is slower in clusters than in the field, which points to merging as an important mechanism for size growth.