Using High-Resolution Simulations to Inform Observations of Galaxy Structure at z~2

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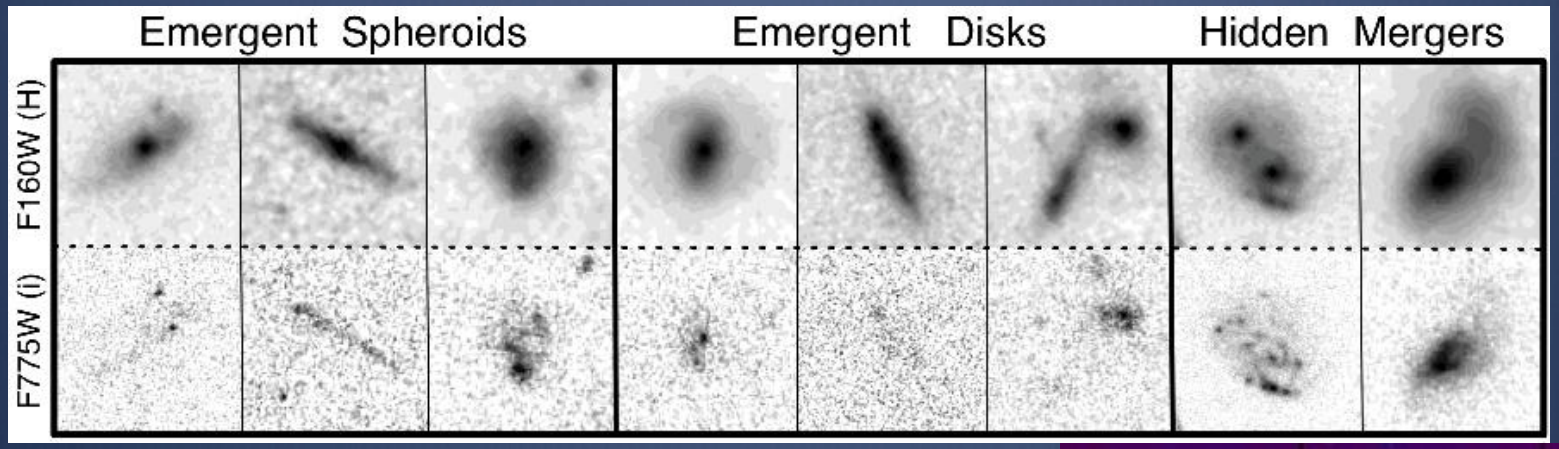
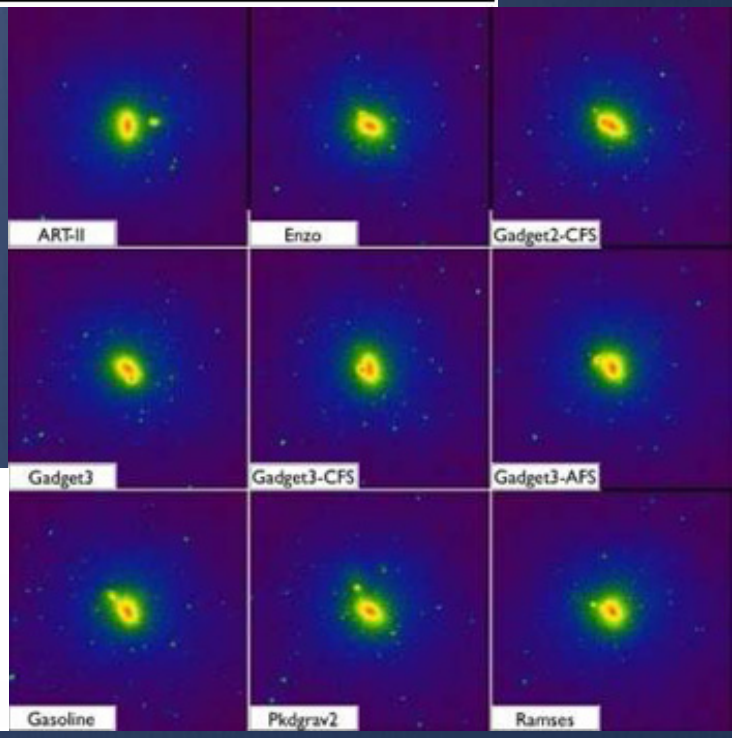
A New Era



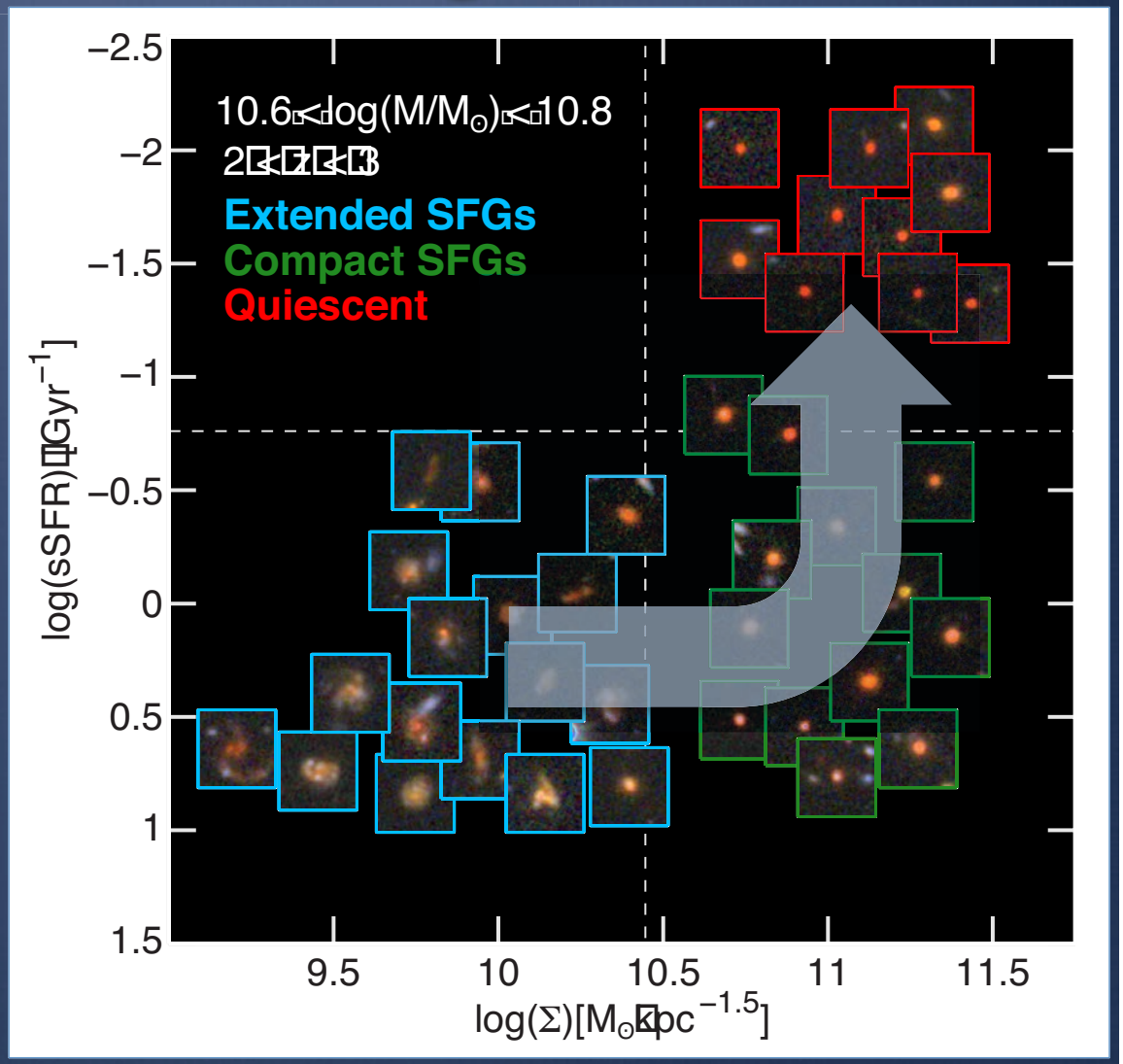
High-resolution observations: CANDELS

High-resolution simulations: AGORA



Galaxy Evolution Revealed by Structural Changes

- Compact blue nuggets as progenitors to massive red nuggets
- "Fast track" vs. "Slow track"



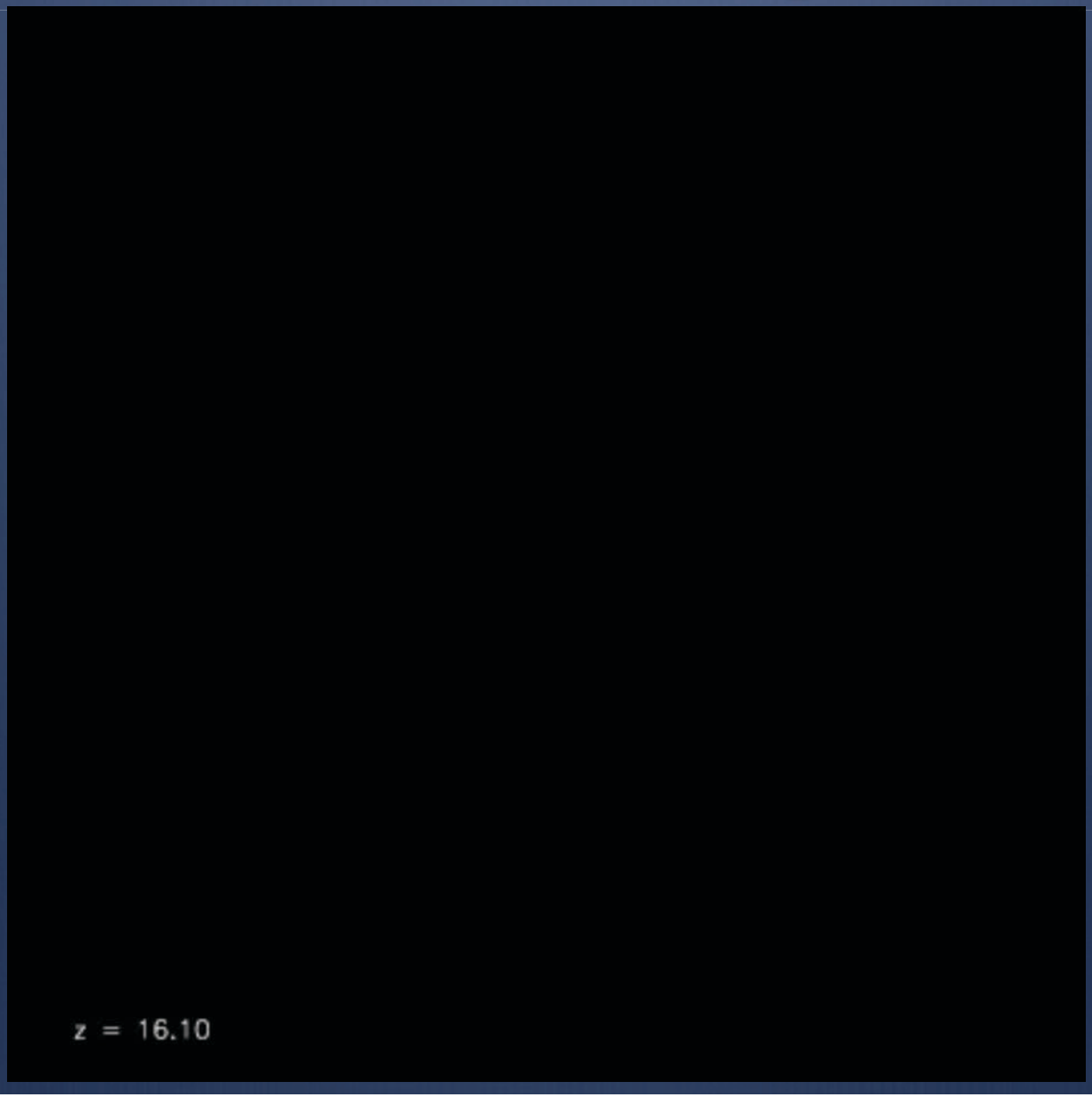
Barro et al. (2014)

Questions of Interest

- Observationally, galaxies evolve to higher-Sersic index, bulge-dominated, lower sSFR galaxies as time progresses. Does this agree with simulations?

VELA28 + radiation pressure

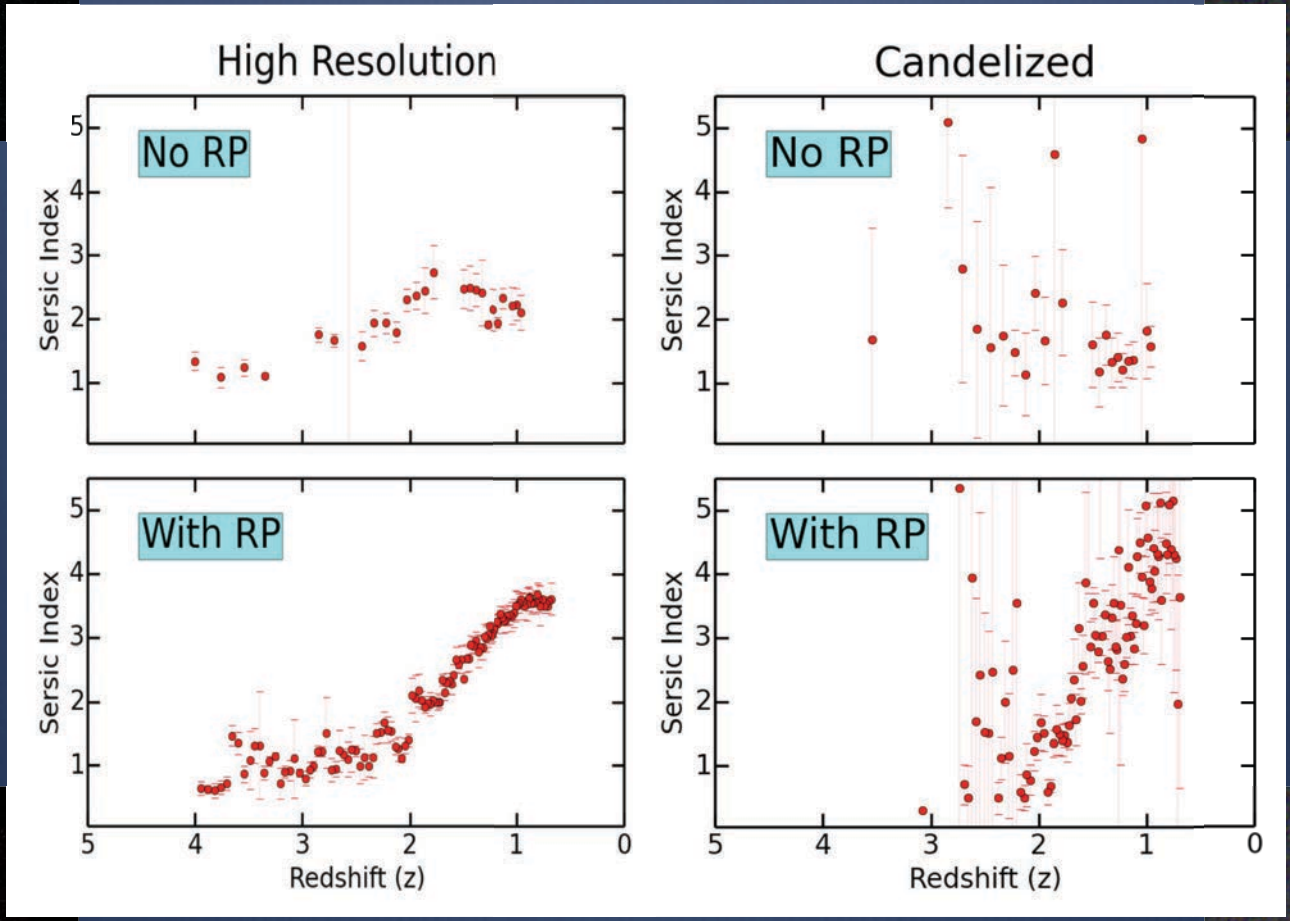
Sunrise-processed images



Ceverino et al. (2014)

z=1

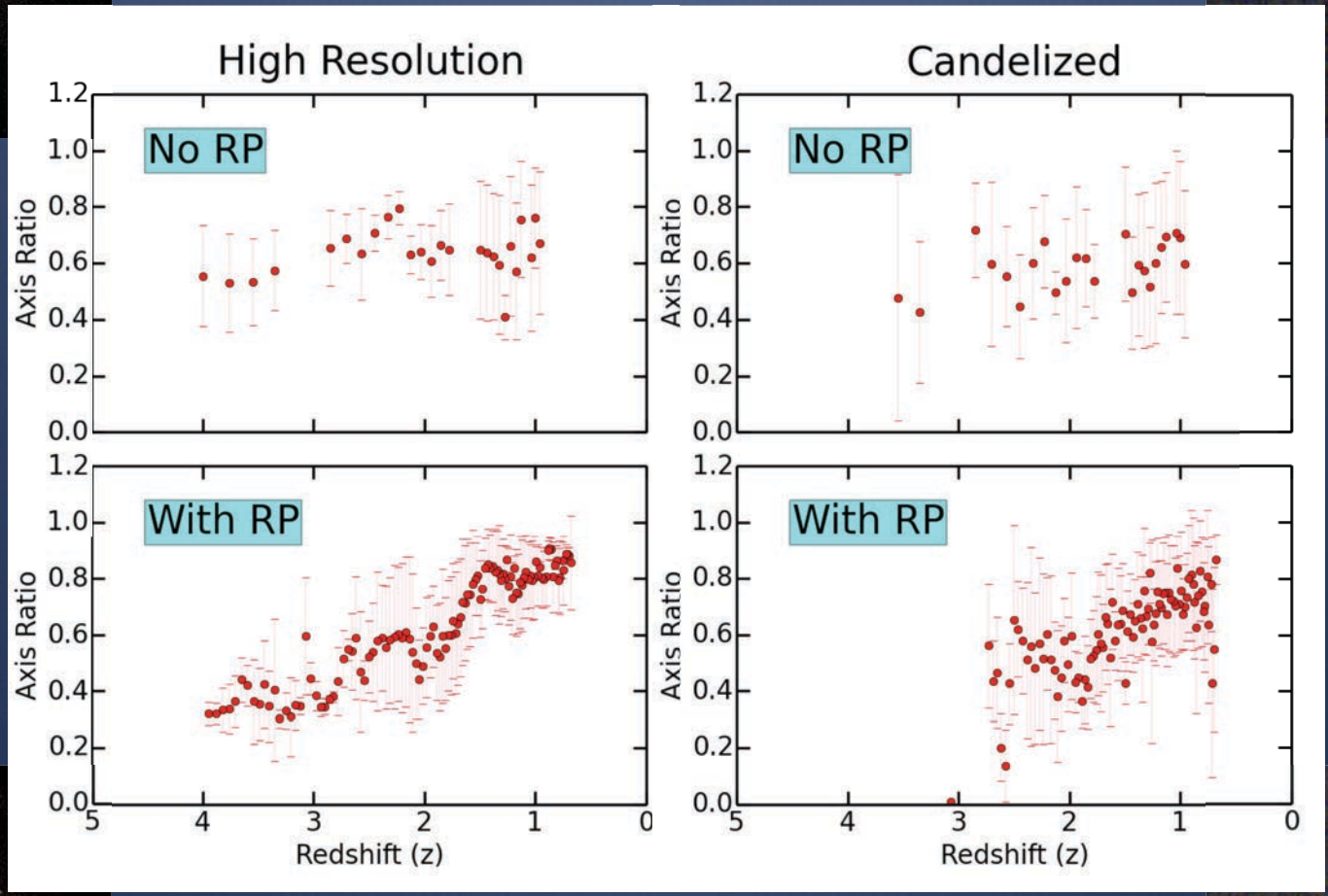
Sersic Index



z=1

z=1

Axis Ratio

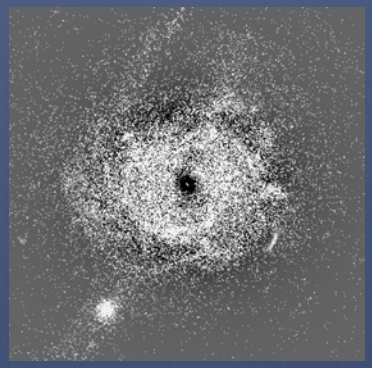


z=1

Galfit Parametric Fitting

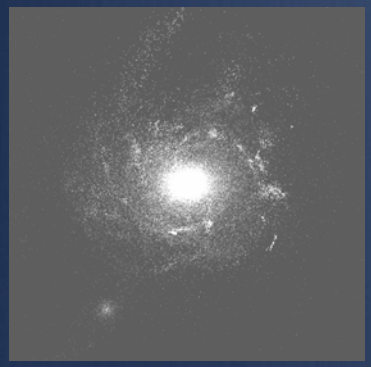
Example:
VELA28MRP
z~1
$M_* \sim 10^{10} M_{sun}$

n=3.85

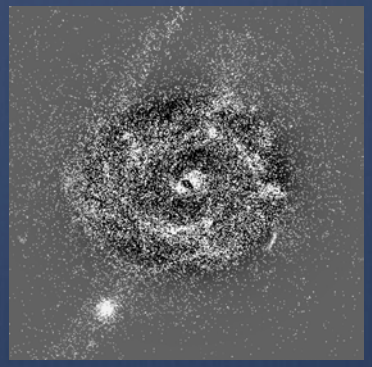


residual

single
Sersic fit



B/T = 0.51

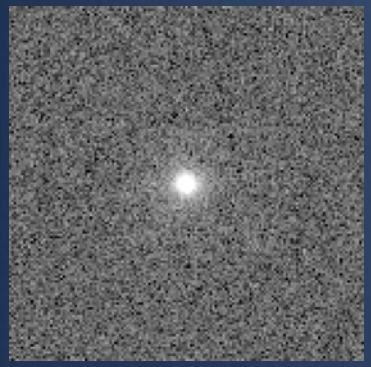


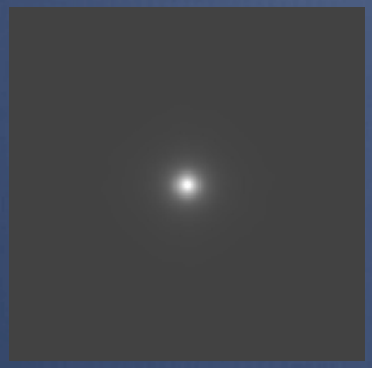
residual

two
component
fit

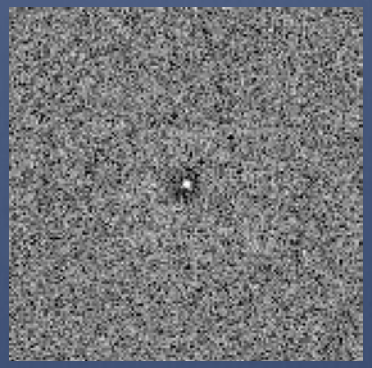
Galfit Parametric Fitting

Example:
VELA28MRP
z~1
$M_* \sim 10^{10} M_{sun}$





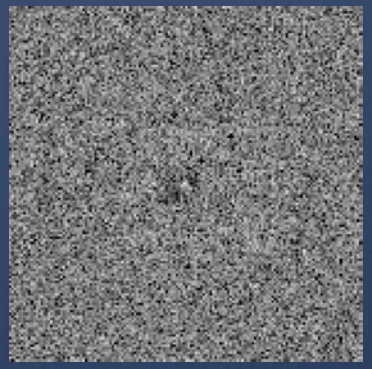
n=3.235



residual

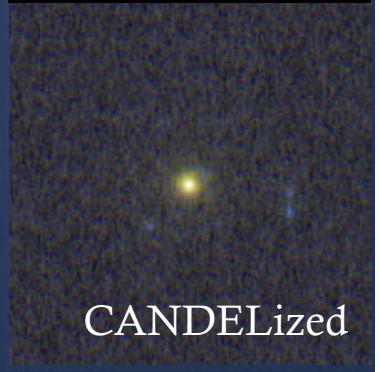
single
Sersic fit

B/T = 0.64



residual

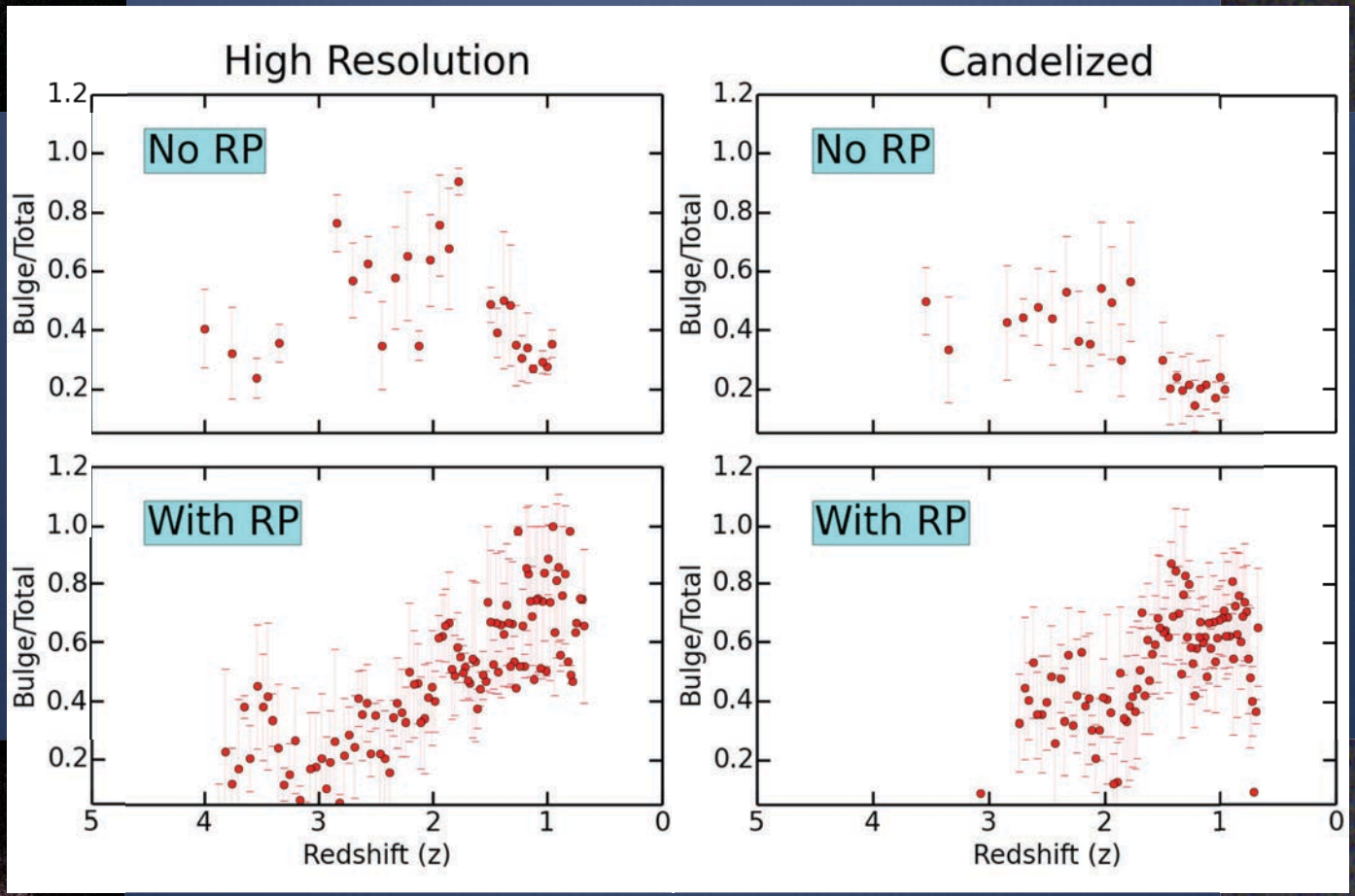
two
component
fit



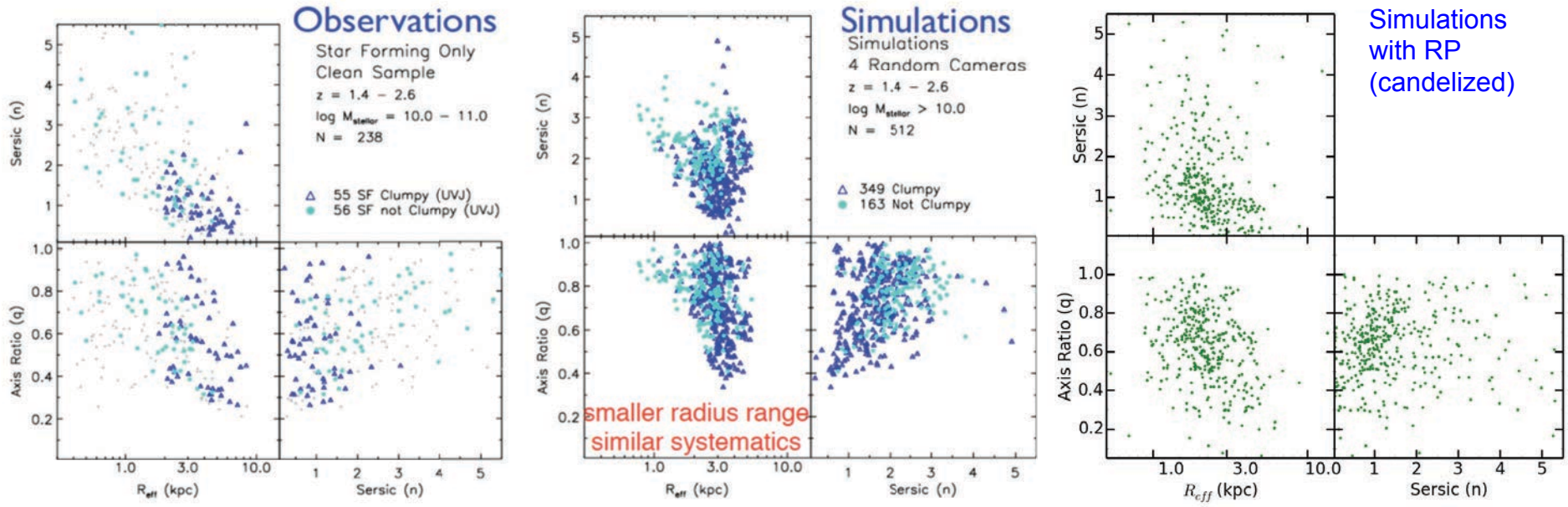
z=1

z=1

Bulge/ Total Ratio



Comparison to CANDELS observations



From the work of Mark Mozena

Results from the new simulations including RP

Questions of Interest

- Observationally, galaxies evolve to higher-Sersic index, bulge-dominated, lower sSFR galaxies as time progresses. Does this agree with simulations?

  yes, but…

- Without AGN feedback we still have star-forming disks at the end of the simulation. Are these present in observations below the noise?

Conclusions and Future Work

- New generation of simulations (+RP) do well at reproducing overall star-forming galaxy properties at z~2 and masses $M_* \sim 10^{10}\ M_{sun}$
- Star-forming disks are present in all of our simulations at late times. Additional AGN feedback required to quench these?
- We still need to:
  - Stack the CANDELized images to see how well we recover the underlying disk (quenched or star-forming).
  - Analyze high-resolution simulation produced by other codes (clues to different physical processes of importance).