

Simulations of Strong Lensing in SPT Clusters

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In collaboration with:

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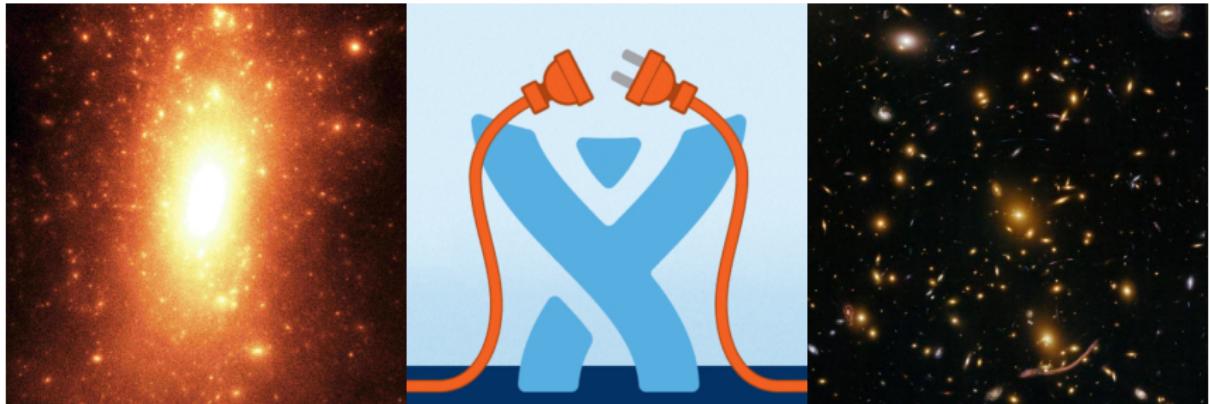
Outline

1 Motivations

2 Simulations of Strong Lensing

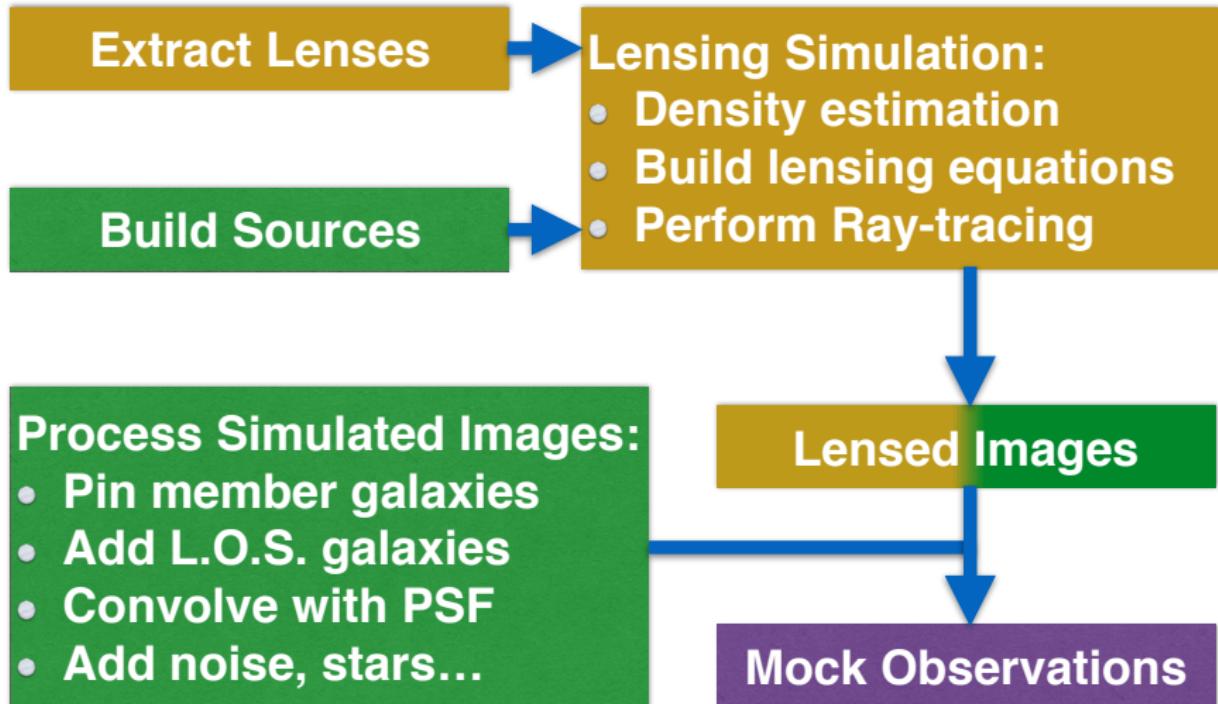
3 Preliminary Results

Simulations of Gravitational Lensing

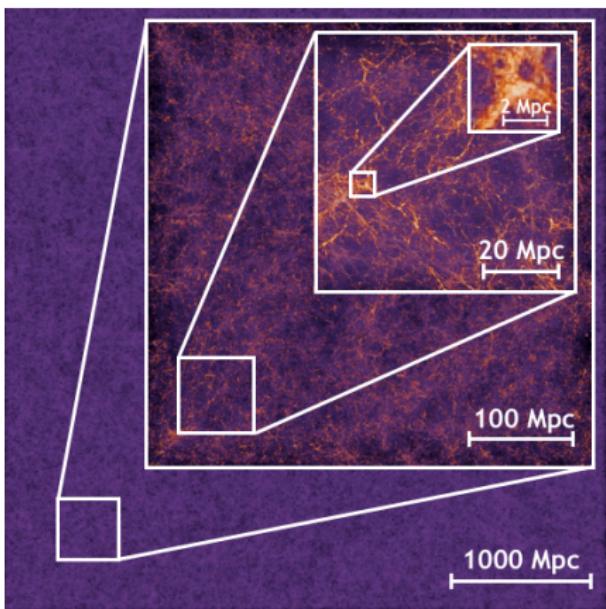


Do N-body simulations correctly predict the strong lensing observed in massive halos across the entire redshift column?

Simulations of Strong Lensing

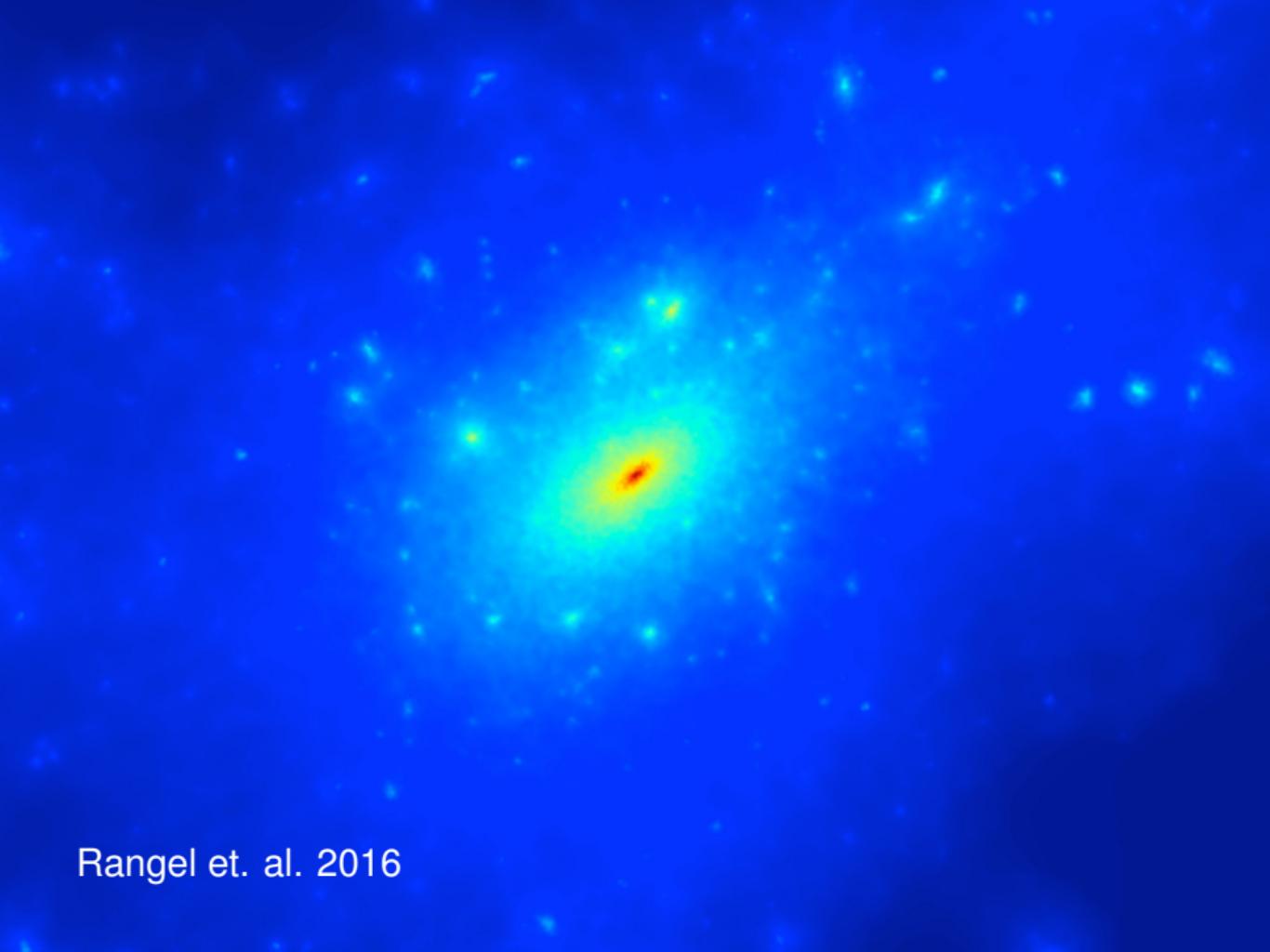


The Outer Rim Simulation

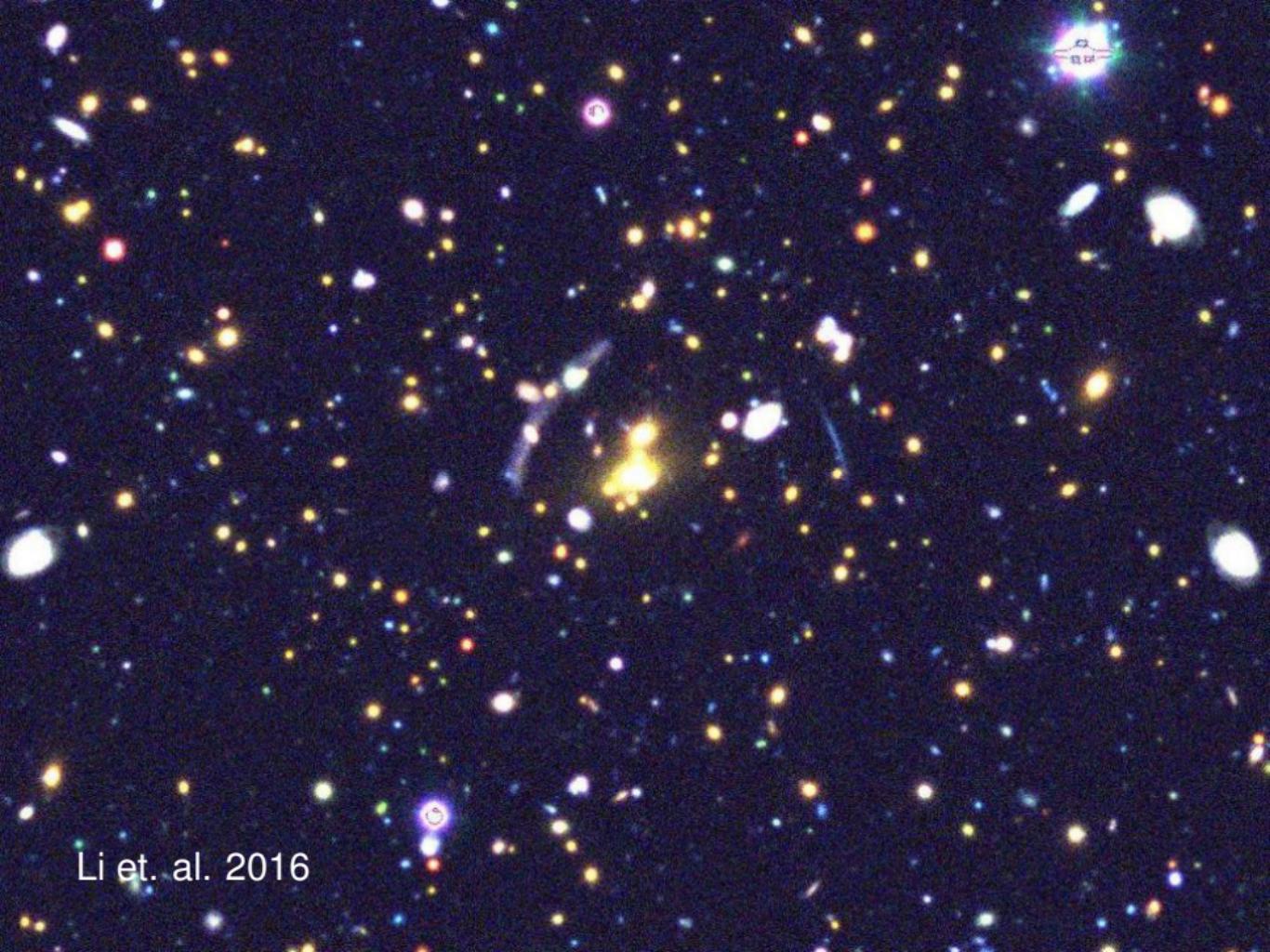


- $V_{\text{box}} = (3h^{-1}\text{Gpc})^3$.
- $M_p = 1.85 \times 10^9 h^{-1} M_\odot$.
- $N_p = 10240^3$.
- 100 snapshots ($z = [10, 0]$).

The Q Continuum Simulation is
with higher mass resolution.
Heitmann et.al. (2014)
arXiv:1411.3396

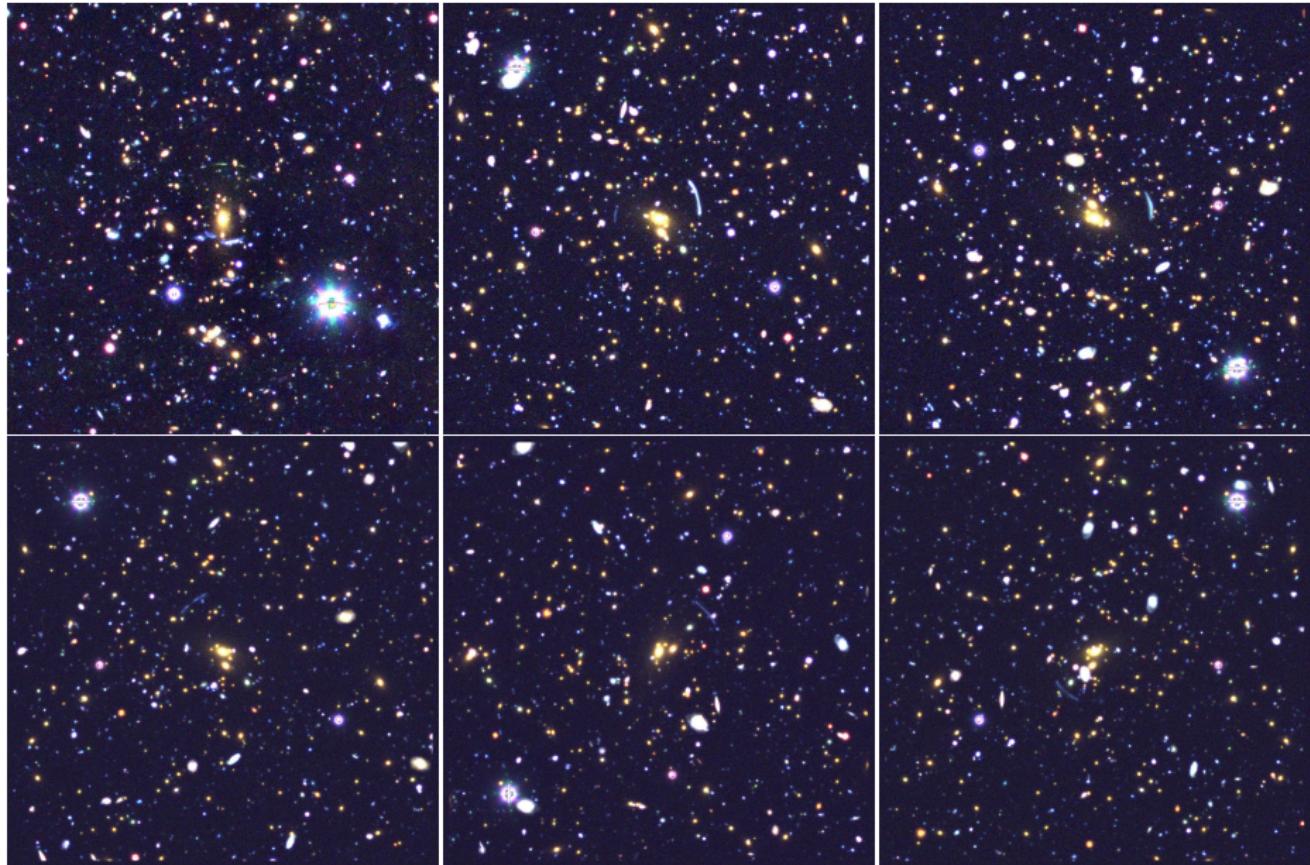


Rangel et. al. 2016

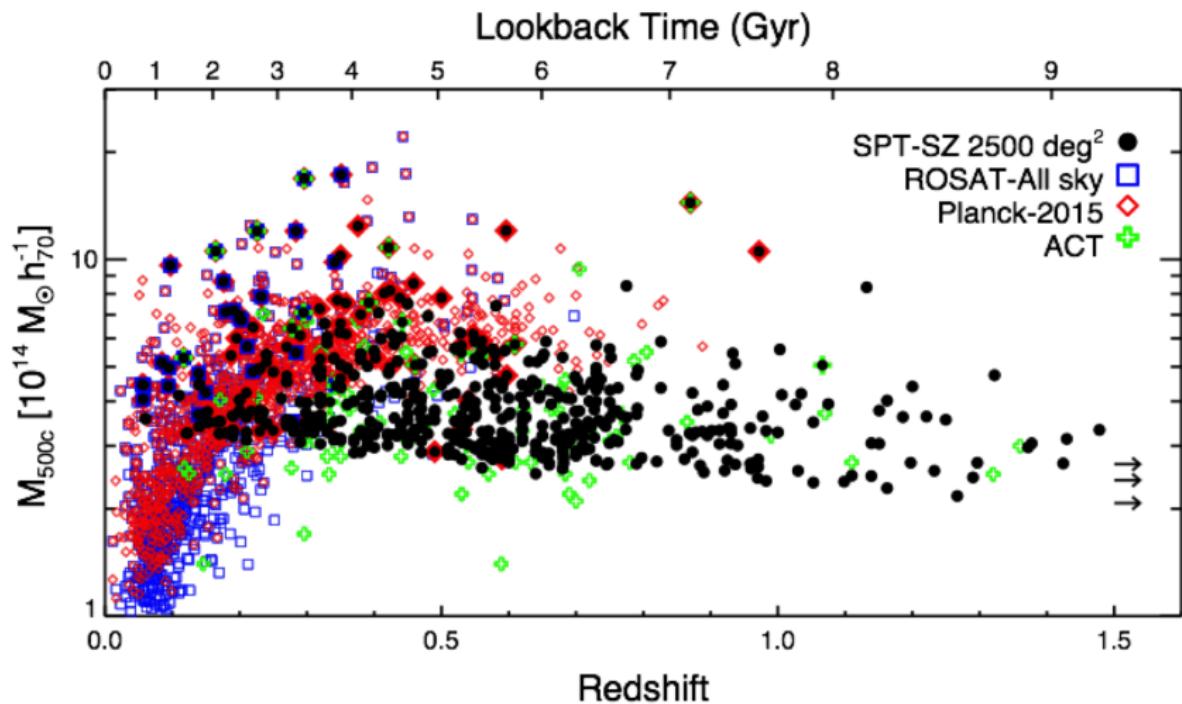


Li et. al. 2016

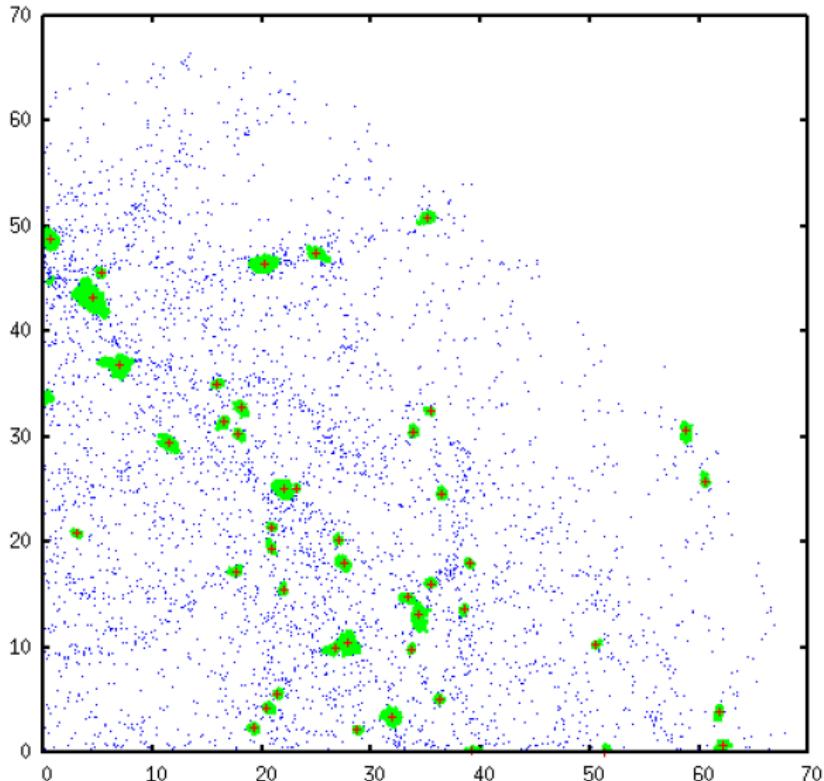
Examples of Simulated Images



The 2500d SPT-SZ Cluster Sample

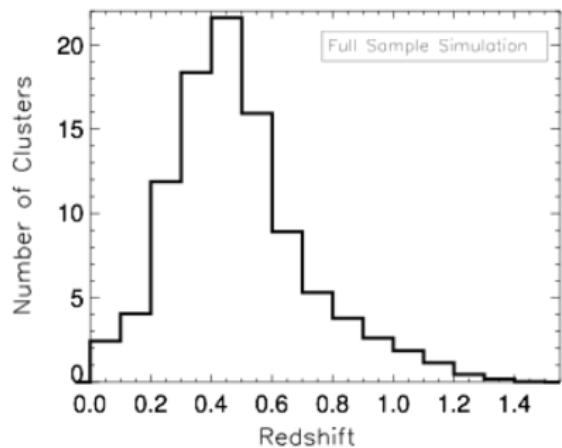


The Light Cone of Massive Halos



Strong Lensing in SPT Cluster Catalog

Preliminary Predicted Lens Redshift Distribution.



- Expect >100 strong lenses with reasonable ($< 0.75''$) ground-based imaging.
- Will be possible to constrain the c-m relation of massive halos to $\sigma \sim 10\%$.
- On-going observational efforts with SPT collaborators:
Imaging Program,
Spectroscopic Followup.

Li et. al. in progress

On-going Work

- Creating about 5000 mock images using the halos in the Outer Rim Simulation.
- Involving halos ($> 1e12 \text{ Msun/h}$ only) on the line of sight by extracting sub-lightcones.
- Investigating statistical properties of simulated images and the photometric followup of SPT clusters.