

## What are the environments of lens galaxies?

*Neal Dalal (IAS), Casey R. Watson (Ohio State)*

Lens galaxy environments can affect lensing observables in multiple ways. Nearby, correlated matter can produce external shear at the lens galaxy, and can lead to a mass-sheet degeneracy in derived quantities like the Hubble constant. We derive constraints on the environments of typical lens galaxies using recent measurements from the Sloan Digital Sky Survey of the number density of massive elliptical galaxies and of the average tangential shear profile around these galaxies. We find that ~25% of lens galaxies are expected to reside in galaxy groups or clusters, and that typical levels of convergence and shear associated with lens environments are  $\kappa \approx \gamma \approx 0.03$ . This implies that environment should not seriously bias estimates of the Hubble constant derived from lens time delays. However, a puzzling discrepancy is that our derived shear values fall far below the levels of external shear measured by modeling strong lensing systems.