Evolution in the Dark Matter Properties of Strong Lenses through Weak Lensing

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Abstract

To fully exploit the information on the dark matter mass profiles of galaxies gained from weak lensing and to tie this to their inner regions where baryons play an important role, we propose to investigate a special sample of galaxies, namely strong gravitational lenses. These systems are excellent targets for weak lensing studies because the Einstein ring radii provide a direct measurement of the projected mass at very small scales -- information that is not available for most galaxy samples. This project is especially well suited for an archival program because nearly every strong lens system has been imaged with HST, and the data are public. What makes this project stand out is that we can compare strong lens samples at moderate redshift (median z ~ 0.6) and lower redshift (median z ~ 0.2) and can, thus, use the full power of combining strong and weak lensing in our investigation of evolutionary effects over this timescale. We will use our samples to (1) measure the average mass profile of the sample to R ~ 300 kpc/h, (2) quantify the evolution of stellar mass and virial mass-to-light ratios, and (3) investigate whether the ``bulge-halo conspiracy", whereby the CDM profiles of galaxies are NFW but the total (baryonic plus CDM) mass profile are isothermal out to ~ 300 kpc/h, is in place at higher redshifts.

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Number of investigators: 8

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Dataset Summary:

Instrument	No. of Datasets	Retrieval Method	Retrieval Plan
ACS	166	FTP	100 datasets per week
WFPC2	348	FTP	100 datasets per week