

Galaxy Shapes and Gravitational Lensing

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Abstract

The mass distributions in gravitational lens galaxies--even just the stellar components--are almost certainly more complicated than we usually assume. This probably contributes to the problems with lensing constraints on the Hubble constant. It might also confound studies of dark matter substructure: we recently found that edge-on disk components in elliptical lens galaxies can create "anomalous" flux ratios similar to those often attributed to dark matter substructure. We propose to critically examine how galaxy shapes affect these applications of gravitational lensing. We will use real galaxies from the GEMS (Galaxy Evolution from Morphology and SEDs) survey to construct a large catalog of mock lenses. Working with mock lenses allows us to perform controlled experiments; but the power comes from using real galaxies so that we automatically include structures that are more general than conventional parametric lens models yet are guaranteed to be realistic. We will use the catalog of mock lenses to determine whether the observed incidence of anomalous flux ratios can be explained by "disky" lens galaxies or requires dark matter substructure. In doing so, we will derive new constraints on the amount of dark matter substructure required or allowed by gravitational lensing, which realistically account for the complexity in galaxy (stellar) mass distributions. We will also use the mock lenses to provide the first objective calibration of non-parametric lens models.

Investigators:

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Number of investigators: 3

Dataset Summary:

Instrument	No. of Datasets	Retrieval Method	Retrieval Plan
ACS	1	FTP	Over one weekend