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# Strong Lensing Search and Confirmation Results from the Dark Energy Survey (12' + 3')

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The Dark Energy Survey (DES) is carrying out a five-year, 5000-sq.-deg. survey of the Southern Galactic Cap. Much of the wide-field area has not yet been systematically surveyed, so we expect to discover many new strongly lensed galaxies and quasars.

One of the main objectives of the strong lensing science program in DES is to derive constraints on dark energy. The two major components of this part of the program will be exploiting (1) lenses with background sources at multiple redshifts and (2) lensed quasars. In addition to cosmology, we will use the cluster-scale lens sample to study dark matter mass profile, along with the large sample of sources at varying redshifts to study galaxy evolution and substructure.

In early DES data, we have identified over 50 candidates for strong gravitational lensing systems. To find lenses, we use a combination of automated arc-finders, photometric catalog searches and visual scans. Each of these methods has particular strengths for finding different types of lenses, distinguished by their geometric configuration —arcs, rings and multiple images. In an effort to confirm these candidates, we performed spectroscopic follow-up of over half of these candidates at the Gemini South 8m telescope.

We present results for the spectroscopic follow-up campaign and the confirmation of new gravitational lenses. As part of the effort to constrain profiles of dark matter haloes, we also present preliminary mass modeling of lenses. Finally, we describe a new 'holistic'technique for finding gravitational lenses based on shapelets. This technique has the potential to find lenses regardless of their geometric configuration, as well as to target the types of lenses most valuable for deriving dark energy constraints.

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