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Wide-Field Lensing Mass Maps from DES Science Verification Data CHIHWAY CHANG, ETH Zürich, VINU VIKRAM, BHUVNESH JAIN, University of Pennsylvania, DAVID BACON, University of Portsmouth, DES COLLABORATION — Weak gravitational lensing allows one to reconstruct the spatial distribution of the projected mass density across the sky. These “mass maps” provide a powerful tool for studying cosmology as they probe both luminous and dark matter. In this paper, we present a weak lensing mass map reconstructed from shear measurements in the 139 deg² SPT-E field from the Dark Energy Survey (DES) Science Verification (SV) data. We compare the distribution of mass with that of the foreground distribution of galaxies and clusters. The overdensities in the reconstructed map correlate well with the distribution of optically detected clusters. Cross-correlating the mass map with the foreground galaxies from the same DES SV data gives results consistent with mock catalogs that include the primary sources of statistical errors in the galaxy, lensing and photo-z catalogs. The statistical significance of the cross-correlation is at the 6.8σ level with 20 arcminute smoothing. We test and validate our results with mock catalogs from N-body simulations. The tools and analysis techniques developed in this paper can be applied to forthcoming larger datasets from DES.

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