Abstract Submitted
for the APR18 Meeting of
The American Physical Society

Density split statistics: Cosmological constraints from counts and lensing in cells in DES Y1 DANIEL GRUEN, Stanford University, DES COLLABORATION — We derive cosmological constraints from the probability distribution function (PDF) of evolved large-scale matter density fluctuations. We do this by splitting lines of sight by density based on their count of tracer galaxies, and by measuring both gravitational shear around and counts-in-cells in overdense and underdense lines of sight, in Dark Energy Survey (DES) First Year data. Our analysis uses a perturbation theory model and is validated using N-body simulation realizations and log-normal mocks. It allows us to constrain cosmology, bias and stochasticity of galaxies w.r.t. matter density and, in addition, the skewness of the matter density field. Our constraints on Ω_m and σ_8 are consistent with the DES 3x2pt results under the assumption that there is only mild stochasticity in galaxy count. As an additional test of gravity, we compare the skewness S_3 of the matter density PDF to its ΛCDM prediction. We find no evidence of excess skewness, with better than 25 per cent relative precision. Notably, on the scales we use, the measurement of the skewness of the PDF improves the uncertainty on cosmological parameters by factors of $\approx$2 relative to a measurement of variance alone.

Daniel Gruen
Stanford University

Date submitted: 11 Jan 2018 Electronic form version 1.4