Characterization of Millimetre-wave Properties of DES Galaxies

DES External Collaborator Proposal

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**Participants:**

**SPT:** Lindsey Bleem\*, Tom Crawford, etc.

(\* Also on DES)

**DES:** ???

**Working Groups:** DES Galaxy Evolution Group

**Datasets:**

1. SPT-SZ filtered 90, 150, 220 GHz maps
2. DES-Year 3 gold catalog with photometric redshifts and stellar mass catalog
3. Hershel SPIRE maps at 250, 350, 500 μm.

**Duration:** 1 year after delivery of Year 3 data to collaboration

**Deliverables:**

**Overview:**

The SPT-SZ (South Pole Telescope – Sunyaev Zel’dovich) camera was a 960 bolometre array installed at the SPT with frequency bands centred at 90, 150, 220 GHz. It mapped a 2500 deg2 area on the sky (20h to 7h in right ascension, −65o to −40o in declination) over 4 years of observation.

For sources the DES galaxy catalog, we will identify the corresponding millimetre (mm) and sub-mm flux densities from the three SPT bands (90, 150, 220 GHz) and Hershel SPIRE bands (250, 350, 500 μm). Similarly to Viero et al (2013), we will sort the galaxies into redshift and stellar mass bins, and for each band in SPT-SZ and Hershel SPIRE data, we will stack the flux densities of all galaxies in a given bin, which would trace out the spectral energy distribution (SED). The SED can be fitted as a modified blackbody curve, from which we can explore several interesting science cases. Firstly, we will determine the overall contribution of mm-wave to the cosmic infrared background (CIB), as well as the contribution in each in redshift and stellar mass bin. We can also estimate the infrared luminosities to classify the luminosity of galaxies contributing to CIB. Lastly, the fit to SEDs infers a temperature of the thermal dust and examine any temperature correlations with redshift and stellar mass.

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Viero, M. P., Moncelsi, L., Quadri, R. F., et al. 2013. ApJ, 779, 32