The optical+NIR (grizYJHK) Fundamental Plane of Early-type Galaxies: Dependence on local and global environment

Using a sample of 39,993 Early-Type galaxies (ETGs) for which data is available from SDSS and UKIDSS, we have undertaken a Spheroid’s Panchromatic Investigation in Different Environmental Regions (SPIDER). We focus on the environmental dependence of the optical+NIR Fundamental Plane (FP) relation. The environment is characterized through local (e.g. galaxy density) and global (e.g. parent group mass) observables, using the largest 3D group/cluster catalog generated from SDSS at low redshift (z<0.1). We find a strong variation of the FP offset with local density in all wavebands, with the variation depending on the galaxy parent halo mass. A clear environmental dependence of the FP slopes is also detected: the “tilt” of the FP is larger for groups relative to field ETGs, and the variation of FP slopes with waveband depends on the galaxy parent halo mass. These results provide important clues for the galaxy evolution scenario, as they constrain the variation of stellar population properties, and dynamical-to stellar mass fraction, as a function of galaxy mass.