

Stellar dynamics of nearby low surface brightness galaxies in integrated light: bridging the gap between dEs, UDGs and dSphs.

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Ultra-diffuse galaxies (UDGs) are spatially extended, low surface brightness stellar systems with regular elliptical-like morphology found in a wide range of environments. Studies of the internal dynamics and dark matter content of UDGs that would elucidate their formation and evolution have been hampered by their low surface brightnesses. Here we present spatially resolved velocity profiles, stellar velocity dispersions, ages and metallicities for 9 UDGs in the Coma cluster. We use intermediate-resolution spectra obtained with Binospec, the MMT's new high-throughput optical spectrograph. We derive dark matter fractions between 50 % and 90 % within the half-light radius using Jeans dynamical models. Three galaxies exhibit major axis rotation, two others have highly anisotropic stellar orbits, and one shows signs of triaxiality. In the Faber–Jackson and mass–metallicity relations, the 9 UDGs fill the gap between cluster dwarf elliptical (dE) and fainter dwarf spheroidal (dSph) galaxies. Overall, the observed properties of all 9 UDGs can be explained by a combination of internal processes (supernovae feedback) and environmental effects (ram-pressure stripping, interaction with neighbors). These observations suggest that UDGs and dEs are members of the same galaxy population.