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Clues on the evolution of S0 galaxies from their activity profiles

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Abstract

S0 galaxies are found in different environments where the physics governing their formation can vary significantly, ranging from galaxy mergers to hydrodynamic interactions. The heterogeneity observed in the properties of this population of galaxies supports the existence of multiple formation mechanisms, but the relative contribution of each of them is still subject to debate. I will present the detection of two main classes of S0 galaxies with different levels of activity, including star formation/AGN and quiescence, among the nearby population. The two classes are identified from the principal component analysis (PCA) of integrated SDSS spectra from a sample of nearly 70,000 S0 galaxies, whose activity is reflected in the position they occupy once projected onto the first two principal components. By extending the PCA classification to spatially resolved spectra of S0 from MaNGA, we can explore the radial configuration of activity in these galaxies. We find that the radial activity gradient in S0 galaxies is tightly related to their PCA classification, BPT designation, and star formation status. Positive activity gradients are common among massive S0 galaxies lying below the star formation main sequence, but not fully passive. These galaxies often exhibit star-forming rings that could be the outcome of the capture of tiny neighboring satellites. Conversely, negative activity gradients are preferentially found in low-mass star-forming S0 galaxies, possibly rejuvenated by minor mergers. Once this activity is quenched, S0 galaxies develop a low-level, flat activity profile. Overall, our results highlight the importance of mergers in the continued evolution of S0 galaxies.

My poster in zenodo.org can be found here