X65a Stellar Metallicity and Quenching Mechanisms in Passive and Star-Forming Galaxies: Insights from the ν^2GC Semi-Analytical Model

劉乾晟（北海道大学）、岡本 崇（北海道大学）、大木平（旭川高専）、長島雅裕（文教大学）

This study investigates the stellar metallicity differences between passive and star-forming galaxies and explores the underlying physical mechanisms. Observational data reveal that passive galaxies exhibit higher metallicities at fixed stellar masses compared to their star-forming counterparts, with these differences diminishing when compared at fixed gravitational potential. Using the ν^2GC model, this research successfully reproduces the observed trends, highlighting the crucial importance of star formation timescale.The findings confirm that passive galaxies are quenched primarily through strangulation. Moreover, extended star formation timescales amplify the metallicity differences, indicating that metal dilution and early quenching play significant roles in shaping these differences. The study also hypothesizes that a "pseudo-strangulation" process in central galaxies, caused by delayed gas accretion in dark matter halos, contributes to the observed metallicity patterns. The results underscore that while supernova feedback and gravitational potential wells influence metallicity evolution, it is the star formation timescale that primarily governs the metallicity offset between passive and star-forming galaxies. These findings confirm strangulation as a key quenching mechanism and offer new insights into the interplay between star formation history and galaxy evolution.