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Tracing Gas and Star formation in Galaxy Mergers with ALMA and MaNGA

Galaxy interactions play a crucial role in the evolution of galaxies in the local universe, often triggering enhanced star formation. Simulations consistently suggest that such interactions significantly reshape the distribution of molecular gas within galactic disks, thereby altering the spatial distribution of star formation. In this study, we aim to observationally investigate the distribution of gas and star formation across different merger stages and assess the extent to which these observations align with simulation predictions.

We analyze a sample of 15 galaxies—including galaxy pairs and post-mergers—with stellar masses log(M*) ≥ 10 [M⊠] and redshifts in the range 0.02 < z < 0.1, using data from ALMA and SDSS-MaNGA. We construct radial profiles of gas fraction, star formation rate (SFR), and star formation efficiency (SFE) extending from the galactic center to 1.5 effective radii (Re). These profiles are then compared with those of main-sequence (i.e., non-interacting) galaxies from previous studies.

Our results indicate that the gas fraction is the primary driver of elevated SFR in interacting galaxies, while SFE plays a more limited role—particularly in post-merger systems. Nevertheless, galaxies across all merger stages show a consistent relationship between SFR and SFE, suggesting the presence of a common regulatory mechanism governing star formation during galaxy interactions.

Section

Galaxy/Extragalactic

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