The Metallicity Evolution of Interacting Galaxies

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Nuclear inflows of metal-poor interstellar gas triggered by galaxy interactions can account for the systematically lower central oxygen abundances observed in local interacting galaxies. Here, we investigate the metallicity evolution of a large set of simulations of colliding galaxies. Our models include cooling, star formation, feedback, and a new stochastic method for tracking the mass recycled back to the interstellar medium from stellar winds and supernovae. We study the influence of merger-induced inflows, enrichment, gas consumption, and galactic winds in determining the nuclear metallicity. The central metallicity is primarily a competition between the inflow of low-metallicity gas and enrichment from star formation. An average depression in the nuclear metallicity of ~0.07 is found for gas-poor disk-disk interactions. Gas-rich disk-disk interactions, on the other hand, typically have an enhancement in the central metallicity that is positively correlated with the gas content. The simulations fare reasonably well when compared to the observed mass-metallicity and separation-metallicity relationships, but further study is warranted.

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