Quantifying Observed Timescales in Galaxy Mergers using Simulations

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Abstract

We propose a study which will quantify the timescales during which merging galaxies of different mass ratios are observed to be morphologically disturbed, have enhanced star formation, or have close companions. This information is necessary for converting observed fractions of interacting galaxies or close pairs in high-redshift HST observations into physical merger rates. The results will constrain the amount of merger-driven star formation that can be "hidden" in the morphologically-normal spiral galaxies which seem to dominate star formation at redshifts around 1. We will also study how merger-driven AGN activity correlates with the evolution of the merging galaxies. The study will be based on simulated images of merging galaxies, generated using hydrodynamic simulations along with a radiative-transfer model. We will also develop an automated merger classification method, based on morphological statistics and colors, which can be applied to high-redshift galaxies in ACS surveys. This method will be able not only to identify merging galaxies but also to tell how far the merger has progressed and make predictions for the timescales of individual merger stages.

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