The Modes of Star Formation in Luminous and Ultraluminous Infrared Galaxies

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Abstract

In the local universe, Ultraluminous Infrared Galaxies (ULIRGs, $L_{\rm IR} > 10^{12} L_{\odot}$) are all interacting and merging systems. To date, studies of ULIRGs at high redshift have found a variety of results due to their varying selection effects and small sample sizes. Some studies have found that mergers still dominate the galaxy morphology while others have found a high fraction of morphologically normal or clumpy star forming disks. Near-infrared imaging is crucial for interpreting galaxy structure at high redshift since it probes the rest frame optical light of a galaxy and thus we can compare directly to studies in the local universe. We explore the evolution of the morphological properties of (U)LIRGs over cosmic time using a large sample of galaxies from Herschel observations of the CANDELS fields (including GOODS, COSMOS, and UDS). In particular, we investigate whether the role of galaxy mergers has changed between $z \sim 2$ and now using the extensive visual classification catalogs produced by the CANDELS team. The combination of a selection from Herschel, near the peak of IR emission, and rest-frame optical morphologies from CANDELS, provides the ideal comparison to nearby (U)LIRGs. We then study the how role of galaxy mergers and the presence of AGN activity correspond to the galaxy's position in the star formation rate - stellar mass plane. Are galaxies that have specific star formation rates elevated above the main sequence more likely to be mergers?