

Molecular Gas in Double-Nuclei Ultraluminous Infrared Galaxies

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Galaxy interactions are responsible for the most luminous galaxy phenomena in the universe, be it starbursts or active galactic nuclei (AGN). Here, we present high-resolution, CO(1 \rightarrow 0) interferometry and HST imaging of a sample of 5 double nuclei, ultraluminous infrared galaxies (ULIGs) in order to observe the distribution of star-forming molecular gas in the progenitor galaxies prior to nuclear coalescence. The 2 cool ($f_{25\mu\text{m}}/f_{60\mu\text{m}} < 0.2$) ULIGs in the sample, whose near-infrared colors are consistent with reddened starbursts, have CO emission associated with both of their stellar nuclei, similar to what is observed for the cool ULIG Arp 220 (Sakamoto et al. 1999). In contrast, the 3 warm ($f_{25\mu\text{m}}/f_{60\mu\text{m}} > 0.2$, similar to Seyfert galaxies) ULIGs have CO emission associated with only the redder, AGN nucleus. These CO morphologies differ from those of less luminous infrared galaxies with similar nuclear separations (< 5 kpc), which have a dominant CO component between the stellar nuclei. We conclude that *(i)* ULIGs have large bulge-to-disk ratios which prevent gas from being stripped as the merger proceeds and *(ii)* some cool ULIGs may achieve their high luminosities primarily from starbursts occurring in both galaxies, whereas the luminosity from some warm ULIGs primarily emanates from an embedded AGN.

Sakamoto et al. 1999, ApJ, 514, 68

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