TESTING THE MERGER HYPOTHESIS OF POWERFUL RADIO GALAXIES

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We present K′-band imaging and millimeter (CO) spectroscopy of a 60 and 100 μm flux-limited sample of 35 low redshift, powerful radio galaxies (LzPRGs: $P_{178\mathrm{MHz}} > 10^{23.5}$ W Hz^{-1} and $0.01 < z < 0.22$). These observations are being obtained to test the hypothesis that the radio activity in LzPRGs is triggered by the merger of gas-rich galaxies, as well as to look for evolutionary correlations between the degree of irregularity in the K′-band morphologies, the amount of star-forming molecular gas, and the radio morphologies.

Several intriguing results have resulted from this survey. Only 40% of the FR II (i.e, lobe-dominated, edge-brightened radio sources, typically with $P_{178\mathrm{MHz}} > 10^{25.3}$ W Hz^{-1}) galaxies show evidence of disturbed, high surface brightness features and multiple nuclei or close companions. Further, aside from the CO detection in the radio galaxy 3C 293 ($z \sim 0.04$), none of the FR II sources have been detected in CO. In contrast, 86% of the radio-compact and FR I (i.e, edge-darkened radio sources, typically with $P_{178\mathrm{MHz}} < 10^{25.3}$ W Hz^{-1}) galaxies show evidence of disturbed, high surface brightness features and multiple nuclei or close companions, and 50% have been detected in CO. Such a dramatic contrast suggests that either the more powerful FR II sources have different origins than the radio-compact and FR I sources (e.g., the progenitors of the FR II sources may be gas-poor relative to the progenitors of radio-compact and FR I sources), or that some compact and FR I sources evolve into FR II galaxies.

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