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# The Two-Component Radio Luminosity Function of QSOs: Star Formation and AGN

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Despite decades of study, it remains unclear whether there are distinct radio-loud and radio-quiet populations of quasi-stellar objects (QSOs). Early studies were limited by inhomogeneous QSO samples, inadequate sensitivity to probe the radio-quiet population, and degeneracy between redshift and luminosity for flux-density-limited samples. Our new 6 GHz EVLA observations allow us for the first time to obtain nearly complete (97%) radio detections in a volume-limited color-selected sample of 179 QSOs more luminous than M_i = -23 from the Sloan Digital Sky Survey (SDSS) Data Release Seven in the narrow redshift range 0.2 < z < 0.3. The dramatic improvement in radio continuum sensitivity made possible with the new EVLA allows us, in 35 minutes of integration, to detect sources as faint as 20 microJy, or log[L_6 (W/Hz)] ~ 21.5 at z = 0.25, well below the radio luminosity, log[L_6 (W/Hz)] ~ 22.5, that separates star-forming galaxies from radio-loud active galactic nuclei (AGNs) driven by accretion onto a super-massive black hole. We calculate the radio luminosity function (RLF) for these QSOs using three constraints: (a) EVLA 6 GHz observations for log[L_6 (W/Hz)] < 23.5, (b) NRAO-VLA Sky Survey (NVSS) observations for log[L_6 (W/Hz)] > 23.5, and (c) the total number of SDSS QSOs in our volume-limited sample. We show that the RLF can be explained as a superposition of two populations, dominated by AGNs at the bright end and star formation in the QSO host galaxies at the faint end.

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