

SPECTRAL ENERGY DISTRIBUTION MODELING OF BROAD EMISSION LINE QUASARS: FROM X-RAY TO RADIO

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We study the differences in physical properties of quasar-host galaxies using an optically selected sample (SDSS DR7) of radio loud (RL) and radio quiet (RQ) quasars in the redshift range $0.15 < z < 1.9$, which we have further cross-matched with the VLA-FIRST survey catalog. The sources in our sample have broad H β and Mg II emission lines ($1000 \text{ km/s} < \text{FWHM} < 15000 \text{ km/s}$) with a subsample of high broad line quasars ($\text{FWHM} > 15000 \text{ km/s}$). We construct the broadband spectral energy distribution (SED) of our broad line quasars using multi-wavelength archival data and targeted observations with the AstroSat telescope. We use the state-of-the-art SED modeling code CIGALE v2022.0 to model the SEDs and determine the best-fit physical parameters of the quasar host galaxies, namely their star-formation rate (SFR), main-sequence stellar mass, luminosity absorbed by dust, e-folding time, and stellar population age. We find that the emission from the host galaxy of our sources is between 20%–35% of the total luminosity, as they are mostly dominated by the central quasars. Using the best-fit estimates, we reconstruct the optical spectra of our quasars which show remarkable agreement in reproducing the observed SDSS spectra of the same sources. We plot the main-sequence relation for our quasars and note that they are significantly offset from the main sequence of star-forming galaxies. Furthermore, the main sequence relation shows a bimodality for our RL quasars indicating populations segregated by Eddington ratios. We also examine the relation between host galaxy and AGN properties. We conclude that RL quasars in our sample with lower Eddington ratios tend to have substantially lower star-formation rates for similar stellar mass. Our analyses thus provide a completely independent route for studying the host galaxies of quasars and addressing the radio dichotomy problem from the host galaxy perspective.