

Optical and Near-UV Spectroscopic Properties of Low-Redshift Jetted Quasars in the Main Sequence in the Main Sequence Context

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Abstract : Quasars have historically been classified into two distinct classes, radio-loud (RL) and radio-quiet (RQ), taking into account the presence and absence of relativistic radio jets, respectively. The absence of spectra with a high S/N ratio led to the impression that all quasars (QSOs) are spectroscopically similar. Although different attempts were made to unify these two classes, there is a long-standing open debate involving the possibility of a real physical dichotomy between RL and RQ quasars. In this work, we present new high S/N spectra of 11 extremely powerful jetted quasars with radio-to-optical flux density ratio > 1000 that concomitantly cover the low-ionization emission of $\text{MgII}\lambda 2800$ and $\text{H}\beta$ as well as the FeII blends in the redshift range $0.35 < z < 1$, observed at Calar Alto Observatory (Spain). This work aims to quantify broad emission line differences between RL and RQ quasars by using the four-dimensional eigenvector 1 (4DE1) parameter space and its main sequence (MS) and to check the effect of powerful radio ejection on the low ionization broad emission lines. Emission lines are analysed by making two complementary approaches, a multicomponent non-linear fitting to account for the individual components of the broad emission lines and by analysing the full profile of the lines through parameters such as total widths, centroid velocities at different fractional intensities, asymmetry, and kurtosis indices. It is found that broad emission lines show large redward asymmetry both in $\text{H}\beta$ and $\text{MgII}\lambda 2800\text{Å}$. The location of our RL sources in a UV plane looks similar to the optical one, with weak FeII UV emission and broad $\text{MgII}\lambda 2800\text{Å}$. We supplement the 11 sources with large samples from previous work to gain some general inferences. The result shows, compared to RQ, our extreme RL quasars show larger median $\text{H}\beta$ full width at half maximum (FWHM), weaker FeII emission, larger λ_{BH} , lower $\lambda_{\text{bol}}/\lambda_{\text{Edd}}$, and a restricted space occupation in the optical and UV MS planes. The differences are more elusive when the comparison is carried out by restricting the RQ population to the region of the MS occupied by RL quasars, albeit an unbiased comparison matching λ_{BH} and $\lambda_{\text{bol}}/\lambda_{\text{Edd}}$ suggests that the most powerful RL quasars show the highest redward asymmetries in $\text{H}\beta$.

Keywords : galaxies, active, line, profiles, quasars, emission lines, supermassive black holes

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