

Study of the relation between the jet and accretion-disk emission in Blazars using RATAN-600 multifrequency data

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Abstract

We study the correlation between the emission from the broad-line region (BLR) and the emission in other wavelength ranges (from radio to x-ray) for the sample of 37 blazars (25 flat-spectrum radio quasars (FSRQs) and 10 BLLac blazars). Studying the relation between luminosities in various wavebands and the BLR luminosity is an effective method to examine the connection between the accretion rate and the luminosity of the jet. We used simultaneous RATAN-600 measurements of blazar flux densities at six frequencies: 1.1, 2.3, 4.8, 7.7, 11.2, and 21.7 GHz. The observational data from other bands was taken from the literature. To determine the effect produced by the state of the object on the correlation, for the radio data we used the measurements obtained with the RATAN-600 in two states—namely, the maximum and minimum flux density values. We show that at some frequencies of the radio band, there exists a correlation of emission with the emission in the BLR for two types of blazars. In the FSRQ and BL Lac blazars, the correlation between the flux from the BLR and the flux in the radio band is indistinguishable in all cases, except for the case when a strong flux density variation was considered for the BL Lac-type of blazars (tens of percent). At the same time, the levels of significance for BL Lac (at certain frequencies p is worse than 0.05) in the active state indicate only the probable presence of connection. On the example of the sample, we show that the variability of emission significantly affects the level of correlation. Our results are consistent with the theoretical predictions about the close relationship of the accretion disk and the jet in blazars. © 2014 Pleiades Publishing, Ltd.

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Keywords

BL Lacertae objects: general, galaxies: jets, galaxies: nuclei, quasars: general, radio continuum: galaxies