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A study of the synchrotron component in the blazar spectral energy distributions

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Abstract

© Pleiades Publishing, Ltd., 2015. We study the synchrotron component of nonthermal radiation of blazars using the spectral energy distribution (SED). The sample contains a total of 877 blazars, including 423 flat-spectrum radio quasars (FSRQs), 361 BL Lac objects and candidates, and 93 blazars of uncertain type. Using the ASDC SED Builder Tool, we have made an estimation of the synchrotron peak frequency ν^{speak} using archive data of different catalogs. The position of the synchrotron peak frequency was determined for 875 objects, which were further classified as follows: 611 low-synchrotron peaked (LSP) blazars ($\nu^{\text{speak}} < 10^{14.5}$ Hz), 222 intermediate-synchrotron peaked (ISP) blazars ($10^{14.5} < \nu^{\text{speak}} < 10^{16.5}$ Hz), and 42 high-synchrotron peaked (HSP) sources ($\nu^{\text{speak}} > 10^{16.5}$ Hz). For the FSRQs the average ν^{speak} is $10^{13.4 \pm 1.0}$ Hz, for the BL Lac-type blazars it equals $10^{14.6 \pm 1.4}$ Hz. We found that ν^{speak} values and the spectral flux density at 4.8 GHz form different distributions for two types of blazars—FSRQ and BL Lac—and for the radio-selected (RBLs) and x-ray-selected (XBLs) blazars. The distribution of ν^{speak} values is broader for BL Lac objects than for FSRQs. There are no ultra-high-energy synchrotron-peak BL Lac objects (UHBLs, with $\nu^{\text{speak}} > 10^{19}$ Hz) in our sample. We have found very-low-synchrotron peaked (VLSP) blazar candidates (with $\nu^{\text{speak}} < 10^{13}$ Hz). Most of them are the FSRQs (41% of the total number) and only 9% are the BL Lac objects. Our results confirm the results of other authors, made on the samples with a significantly smaller number of objects.

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Keywords

BL Lacertae objects: general, Galaxies: jets, Galaxies: nuclei, Quasars: general, Radio continuum: galaxies