

The Blazar Times

A Research Newsletter Dedicated to the BL Lac and Blazar Phenomena

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Journal Abstracts

Radio Identification of the X-ray Jet in the z=4.3 Quasar GB 1508+5714

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The recent discovery of an X-ray jet in the z=4.3 quasar GB 1508+5714 by Yuan et al. (astro-ph/0309318) and Siemiginowska et al. (astro-ph/0310241) prompted a search for its radio counterpart. Here, we report the successful discovery of faint radio emission from the jet at 1.4 GHz using archival VLA data. The X-ray emission is best interpreted as inverse Compton (IC) emission off the CMB as discussed by the previous investigators. In this scenario, its high X-ray to radio monochromatic luminosity ratio, compared to previously detected IC/CMB X-ray jets at lower redshift, is a natural consequence of its high redshift.

Accepted by ApJL

For preprints contact: ccheung@brandeis.edu *For preprints via ftp or WWW:* <http://arXiv.org/abs/astro-ph/0310733>

BeppoSAX Observations of 1-Jy BL Lacertae Objects - II

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We present new *BeppoSAX* LECS and MECS observations, covering the energy range 0.1 – 10 keV (observer's frame), of four BL Lacertae objects selected from the 1 Jy sample. All sources display a flat ($\alpha_x \sim 0.7$) X-ray spectrum, which we interpret as inverse Compton emission. One object shows evidence for a low-energy steepening ($\Delta\alpha_x \sim 0.9$) which is

likely due to the synchrotron component merging into the inverse Compton one around ~ 2 keV. A variable synchrotron tail would explain why the *ROSAT* spectra of our sources are typically steeper than the *BeppoSAX* ones ($\Delta\alpha_x \sim 0.7$). The broad-band spectral energy distributions fully confirm this picture and model fits using a synchrotron inverse Compton model allow us to derive the physical parameters (intrinsic power, magnetic field, etc.) of our sources. By combining the results of this paper with those previously obtained on other sources we present a detailed study of the *BeppoSAX* properties of a well-defined sub-sample of 14 X-ray bright ($f_x(0.1 - 10 \text{ keV}) > 3 \times 10^{-12} \text{ erg cm}^{-2} \text{ s}^{-1}$) 1-Jy BL Lacs. We find a very tight proportionality between nearly simultaneous radio and X-ray powers for the 1-Jy sources in which the X-ray band is dominated by inverse Compton emission, which points to a strong link between X-ray and radio emission components in these objects.

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For preprints via ftp or WWW: <http://xxx.lanl.gov/abs/astro-ph/0311084>

Constraints on the Very High Energy Emission from BL Lacertae Objects

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We present results from observations of 29 BL Lacertae objects, taken with the Whipple Observatory 10 m Gamma-Ray Telescope between 1995 and 2000. The observed objects are mostly at low redshift ($z < 0.2$) but observations of objects of z up to 0.444 are also reported. Five of the objects are EGRET sources and two are unconfirmed TeV sources. Three of the confirmed sources of extragalactic TeV gamma rays were originally observed as part of this survey and have been reported elsewhere. No significant excesses are detected from any of the other objects observed, on time scales of days, months or years. We report 99.9% confidence level flux upper limits for the objects for each observing season. The flux upper limits are typically 20% of the Crab flux although, for some sources, limits as sensitive as 6% of the Crab flux were derived. The results are consistent with the synchrotron-self-Compton (SSC) model predictions considered in this work.

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For preprints via ftp or WWW: <http://lanl.arxiv.org/abs/astro-ph/0311397>

Jet Formation in BL Lacertae Objects with Different Accretion Modes

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We estimate the masses of massive black holes in BL Lac objects from their host galaxy luminosity. The power of jets and central optical ionizing luminosity for a sample of BL Lac objects are derived from their extended radio emission and the narrow-line emission, respectively. The maximal jet power can be extracted from a standard thin accretion disk/spinning black hole is calculated as a function of dimensionless accretion rate \dot{m} ($\dot{m} = \dot{M}/\dot{M}_{\text{Edd}}$). Comparing with the derived jet power, we find that the accretion disks in most BL Lac objects should not be standard accretion disks. For a pure advection dominated accretion flow (ADAF), there is an upper limit on its optical continuum luminosity due to the existence of an upper limit \dot{m}_{crit} on the accretion rate. It is found that a pure ADAF is too faint to produce the optical ionizing luminosity of BL Lac objects derived from their narrow-line luminosity. We propose that an ADAF is present in the inner region of the disk and it becomes a standard thin disk in the outer region in most BL Lac objects, i.e., ADAF+SD(standard disk) scenario. This ADAF+SD scenario can explain both the jet power and optical ionizing continuum emission of these BL Lac objects. The inferred transition radii between the inner ADAF and outer SD are in the range of $40 - 150GM_{bh}/c^2$, if the disks are accreting at the rate $\dot{m} = 0.01$.

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For preprints via ftp or WWW: <http://xxx.uni-augsburg.de/abs/astro-ph/0308524>

Black Hole Masses and Doppler Factors of γ -ray Active Galactic Nuclei

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The sizes of the broad-line regions (BLRs) in γ -ray active galactic nuclei (AGNs) are estimated from their optical continuum luminosity by using the empirical relation between R_{BLR} and $L_{\lambda, \text{opt}}$. Using the broad emission line data, we derive the photon energy density in the relativistic blobs near the massive black holes in AGNs. We calculate the power of the broad-line photons Compton up-scattered by the relativistic electrons in the blobs. Compared with observed γ -ray emission data, the Doppler factors δ of the blobs for a sample of 36 γ -ray AGNs are derived, which are in the range of $\sim 3 - 17$. We estimate the central black hole masses of these γ -ray AGNs from the sizes of the BLR and the broad line widths. It is found that the black hole masses are in the range of $\sim 10^8 - 10^{10}M_{\odot}$. A significant correlation is found between the Doppler factor δ and the core dominance parameter R . The results are consistent with the external radiation Compton (ERC) models for γ -ray emission from AGNs. The soft seed photons are probably from the broad-line regions.

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Abstract Guidelines

Abstracts for “The Blazar Times” are solicited for papers that have been recently accepted for publication by a refereed journal, and for recent Ph.D. theses. Please do not submit an abstract before it has been accepted, nor after it is published. Abstracts from papers which are not refereed (e.g., conference proceedings) are not accepted.

The subject matter should pertain directly to the BL Lac and/or blazar phenomenon in general. Both observational and theoretical abstracts are appropriate. Abstracts from papers dealing with other classes of AGN will generally not be included unless they explicitly discuss their relevance to the blazar phenomenon; however exceptions to this rule will be considered.

A monthly call for abstracts will be issued and abstracts received by the last day of the month will usually appear in the following month’s newsletter. Announcements of general interest to the BL Lac and blazar communities may also be submitted for posting in the newsletter. These might include (but are not restricted to) the following: (i) *Job Openings* directed toward blazar researchers, (ii) announcements of *Upcoming Meetings*, (iii) announcements of *Upcoming Observing Campaigns* for which participation is solicited from the community at large, (iv) reviews of *New Books*, and (v) *General Announcements* that provide or request research-related information.

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