

# *The Blazar Times*

A Research Newsletter Dedicated to the BL Lac and Blazar Phenomena

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## *Editorial*

I have relocated to the National Radio Astronomy Observatory in Socorro. *The Blazar Times* has moved as well. Please send submissions, subscription requests, and any other correspondence relevant to the newsletter to this new address:

blazar@nrao.edu

*The Blazar Times* web page has also moved to:

<http://www.aoc.nrao.edu/~trector/blazar/>

The new website features several improvements, including an HTML version of the newsletter as well as improved PDF generation which should result in better on-screen font display. I hope you find the improvements useful. As always, please let me know if you have any problems.

Best wishes, Travis A. Rector

## *Journal Abstracts*

### *BeppoSAX Spectral Survey of BL Lacs - New Spectra and Results*

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We present *BeppoSAX* LECS, MECS, and PDS spectra of eleven X-ray selected BL Lacertae objects. Combining these sources with the ones presented elsewhere we have a sample of 21 BL Lacs from the Einstein Medium Sensitivity and

Einstein Slew Survey. The sample shows strong correlations of several physical parameters with the peak frequency of the synchrotron branch of the spectral energy distribution. In particular the peak frequency is correlated to the X-ray spectral shape: objects with the peak near to the X-ray band show harder and straighter X-ray spectra than those of the low energy peaked sources. This work shows that the recently proposed unification scenario for different types of blazars can hold also within the class of high frequency peaked BL Lac objects.

Accepted by A&A

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*For preprints via WWW:* <http://xxx.uni-augsburg.de/abs/astro-ph/0112311>

## Relation between radio core length and black hole mass for active galactic nuclei

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We explore the relation between the linear length of radio core and the central black hole mass for a sample of radio-loud active galactic nuclei (AGNs). An empirical relation between the size of the broad line region (BLR) and optical luminosity is used to estimate the size of the BLR. The black hole mass is derived from H $\beta$  line width and the radius of the BLR on the assumption that the clouds in BLRs are orbiting with Keplerian velocities. A significant intrinsic correlation is found between the linear length of the core and the black hole mass, which implies that the jet formation is closely related with the central black hole. We also find a strong correlation between the black hole mass and the core luminosity.

Accepted by MNRAS

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*For preprints via ftp or WWW:* <http://xxx.lanl.gov/abs/astro-ph/0110541>

## A Survey of Extended Radio Jets in AGN with Chandra and HST: First Results

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We present the first results from an X-ray and optical survey of a sample of AGN radio jets with Chandra and HST. We focus here on the first six sources observed at X-rays, in four of which a bright X-ray jet was detected for the first time. In three out of four cases optical emission from the jet is also detected in our HST images. We compare the X-ray morphology with the radio as derived from improved processing of archival VLA data and we construct spectral energy distributions (SED) for the most conspicuous emission knots. In most cases the SEDs, together with the similarity of the X-ray and radio morphologies, favor an inverse Compton origin of the X-rays. The most likely origin of the seed photons is the Cosmic Microwave Background, implying the jets are still relativistic on kiloparsec scales. However, in the first knot of the PKS 1136-135 jet, X-rays are likely produced via the synchrotron process. In all four cases bulk Lorentz factors of a few are required. The radio maps of the two jets not detected by either Chandra or HST suggest that they are less beamed at large scales than the other four detected sources. Our results demonstrate that, at the sensitivity and resolution of Chandra, X-ray emission from extragalactic jets is common, yielding essential information on their physical properties.

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## TeV candidate BL Lac objects

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The TeV emission of low power BL Lac objects has been established by the detection of an handful of them. The knowledge of the level of the TeV emission and its spectrum can shed light on the particle acceleration mechanisms, and it is especially important to assess the still uncertain level of the far infrared background radiation, which can absorb the TeV photons through photon–photon interactions. In view of these implications, it is necessary to enlarge the number of TeV detected sources, and to find them at different redshifts. To this aim, we propose a general and simple criterium to select the best TeV candidates, and produce a list of them with flux estimates above 40 GeV, 300 GeV and 1 TeV.

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For preprints via ftp or WWW: <http://babbage.sissa.it/>, [astro-ph/0112201](http://astro-ph/0112201)

## BL Lacertae: complex spectral variability and rapid synchrotron flare detected with BeppoSAX

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We report on two BeppoSAX observations of BL Lac (2200+420) performed respectively in June and December 1999, as part of a ToO program to monitor blazars in high states of activity. During both runs the source has been detected up to 100 keV, but it showed quite different spectra: in June it was concave with a very hard component above 5-6 keV ( $\alpha_1 \sim 1.6$ ;  $\alpha_2 \sim 0.15$ ); in December it was well fitted by a single power law ( $\alpha \sim 0.6$ ). During the first BeppoSAX observation BL Lac showed an astonishing variability episode: the 0.3 – 2 keV flux doubled in  $\sim 20$  minutes, while the flux above 4 keV was almost constant. This frequency-dependent event is one of the shortest ever recorded for BL Lac objects and places lower limits on the dimension and magnetic field of the emitting region and on the energy of the synchrotron radiating electrons. A similar but less extreme behaviour is detected also in optical light curves, that display non-simultaneous, smaller fluctuations of  $\sim 20\%$  in 20 min. We fit the spectral energy distributions with a homogeneous, one-zone model to constrain the emission region in a very simple but effective SSC + external Compton

scenario, highlighting the importance of the location of the emitting region with respect to the Broad Line Region and the relative spectral shape dependence. We compare our data with historical radio to  $\gamma$ -ray Spectral Energy Distributions.

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## **An AGN Identification for 3EG J2006-2321**

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We present a multiwavelength analysis of the high-energy gamma-ray source 3EG J2006-2321 ( $l = 18^\circ.82$ ,  $b = -26^\circ.26$ ). The flux of this source above 100 MeV is shown to be variable on time scales of days and months. Optical observations and careful examination of archived radio data indicate that its most probable identification is with PMN J2005-2310, a flat-spectrum radio quasar with a 5-GHz flux density of 260 mJy. Study of the  $V = 19.3$  optical counterpart indicates a redshift of 0.833 and variable linear polarization. No X-ray source has been detected near the position of PMN J2005-2310, but an X-ray upper limit is derived from ROSAT data. This upper limit provides for a spectral energy distribution with global characteristics similar to those of known gamma-ray blazars. Taken together, these data indicate that 3EG J2006-2321, listed as unidentified in the 3rd EGRET Catalog, is a member of the blazar class of AGN. The 5-GHz radio flux density of this blazar is the lowest of the 68 EGRET-detected AGN. The fact that EGRET has detected such a source has implications for unidentified EGRET sources, particularly those at high latitudes ( $|b| > 30^\circ$ ), many of which may be blazars.

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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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Contributions and all other correspondence relevant to the newsletter should also be sent to the above address. Please note that I respect the privacy of subscribers; therefore I will not distribute *under any circumstance* the subscriber email list.

To contribute, please use the appropriate LaTeX abstract and thesis templates, which can be obtained from “The Blazar Times” web page at:

`http://www.aoc.nrao.edu/~trector/blazar/`

Abstracts which are not in this template format cannot be accepted. Both templates are stand-alone LaTeX documents; and I ask that you compile them with LaTeX to check for any errors before submitting. This will save me tremendous efforts in solving any problems; and will assure that your abstract will appear in the newsletter as you had intended. Important: If you use any specially defined characters be sure to include their definitions as well.