The Blazar Times

A Research Newsletter Dedicated to the BL Lac and Blazar Phenomena

No. 67 — March 2005 Editor: Travis A. Rector (blazar@uaa.alaska.edu)

TABLE OF CONTENTS

Journal Abstracts

Intrinsic Curvature in the X-ray Spectra of BL Lacertae Objects

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We report results from *XMM-Newton* observations of thirteen X-ray bright BL Lacertae objects, selected from the *Einstein* Slew Survey sample. The survey was designed to look for evidence of departures of the X-ray spectra from a simple power law shape (i.e., curvature and/or line features), and to find objects worthy of deeper study. Our data are generally well fit by power-law models, with three cases having hard ($\Gamma < 2; dN/dE \propto E^{-\Gamma}$) spectra that indicate synchrotron peaks at $E \gtrsim 5$ keV. Previous data had suggested a presence of absorption features in the X-ray spectra of some BL Lacs. In contrast, none of these spectra show convincing examples of line features, either in absorption

or emission, suggesting that such features are rare amongst BL Lacs, or, more likely, artifacts caused by instrumental effects. We find significant evidence for intrinsic curvature (steepening by $d\Gamma/d(\log E) = 0.4 \pm 0.15$) in fourteen of the seventeen X-ray spectra. This cannot be explained satisfactorily via excess absorption, since the curvature is essentially constant from $0.5 - 6$ keV, an observation which is inconsistent with the modest amounts of absorption that would be required. We use the *XMM-Newton* Optical Monitor data with concurrent radio monitoring to derive broadband spectral energy distributions and peak frequency estimates. From these we examine models of synchrotron emission and model the spectral curvature we see as the result of episodic particle acceleration.

Accepted by ApJ, to appear 1 June 2005

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Are Quasar Jets Dominated by Poynting Flux?

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The formation of relativistic astrophysical jets is presumably mediated by magnetic fields threading accretion disks and central, rapidly rotating objects. As it is accelerated by magnetic stresses, the jet's kinetic energy flux grows at the expense of its Poynting flux. However, it is unclear how efficient is the conversion from magnetic to kinetic energy and whether there are any observational signatures of this process. We address this issue in the context of jets in quasars. Using data from all spatial scales, we demonstrate that in these objects the conversion from Poynting-flux-dominated to matter-dominated jets is very likely to take place closer to the black hole than the region where most of the Doppler boosted radiation observed in blazars is produced. We briefly discuss the possibility that blazar activity can be induced by global MHD instabilities, e.g., via the production of localized velocity gradients that lead to dissipative events such as shocks or magnetic reconnection, where acceleration of relativistic particles and production of non-thermal flares is taking place.

Accepted by ApJ

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A Northern Survey of Gamma-Ray Blazar Candidates

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In preparation for *GLAST*, we have compiled a sample of blazar candidates to increase the pool of well studied AGN from which *GLAST* counterparts will be drawn. Sources were selected with our Figure of Merit (FoM) ranking; thus, they have radio and X-ray properties very similar to the *EGRET* blazars. Spectroscopic confirmation of these candidates is in progress, and more than 70% of these objects have been identified as flat spectrum radio quasars and BL Lac objects. We present ∼250 new optical blazar identifications based on McDonald Observatory spectroscopy, 224 with redshifts. Of these, 167 are in our FoM-selected set.

To motivate the γ-ray nature of these objects, we analyzed the current release of the *EGRET* data for possible point sources at their radio positions. We develop two distinct methods to combine multiple *EGRET* observations of a sky position into a single detection significance. We report a detection of the signal of the set of blazar candidates in the *EGRET* data at the $> 3\sigma$ level by both techniques. We predict that the majority of these blazar candidates will be found by *GLAST* due to its increased sensitivity, duty cycle and resolving power.

Accepted by ApJ

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For preprints via ftp or WWW: http://www.arxiv.org/pdf/astro-ph/0503115

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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