# *The Blazar Times*

**A Research Newsletter Dedicated to the BL Lac and Blazar Phenomena**

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## *Editorial*

*The Blazar Times* will again take a recess during the holiday season. The next issue will be in February 2003. Happy winter solstice!

Travis A. Rector

## *Journal Abstracts*

### The Disc-Jet Relation in Strong-lined Blazars

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The relation between accretion disc (thermal emission) and jet (non-thermal emission) in blazars is still a mystery as, typically, the beamed jet emission swamps the disc even in the ultraviolet band where disc emission peaks. In this paper we estimate the accretion disc component for 136 flat-spectrum radio quasars selected from the Deep X-ray Radio Blazar Survey. We do this by deriving the accretion disc spectrum from the mass and accretion rate onto the central black hole for each object, estimated using the emission line widths and the power emitted from the broad line region. We find that non-thermal emission dominates the optical/UV band of our sources. The thermal component, in fact, is, on average, $\sim 15$ per cent of the total and $> 90$ per cent of the objects in the sample have a thermal component $< 0.5$ of the total luminosity. We then estimate the integrated disc and kinetic jet powers and find that, on average, the disc luminosity is $\sim 1$ to 20 times the jet power (depending on the uncertainties in the estimation of the latter quantity). A comparison with previous, independent results favours a scenario in which jet and disk powers are of the same order of magnitude. Extraction of energy from a rotating black hole via the "Blandford-Znajek" mechanism fails to explain the estimated jet power in the majority of our sources. Finally, we find that the typical masses for our sources are $\sim 5 \times 10^8 M_\odot$ and that, contrary to previous claims, about one quarter of our radio quasars have relatively small ($< 3 \times 10^8 M_\odot$) black hole mass.

Accepted by Montly Notices of the RAS

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*For preprints via ftp or WWW*: http://arXiv.org/abs/astro-ph/0211147

## Ultra Fast Self-Compton Cooling

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We investigate the synchrotron self-Compton process in a planar shell taking the shock structure into account. We find that the energy density of the seed photons could deviate from the one-zone estimate by order of unity depending on the shock velocity and the electron cooling time. We also find that as the electron cooling becomes faster, the seed photons are increased more, so that the inverse Compton cooling becomes more efficient. This "ultra" fast cooling may work in such as gamma-ray bursts, blazars and microquasars.

Accepted by ApJ

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## Rapid Variability and Annual Cycles in the Characteristic Time-scale of the Scintillating Source PKS 1257−326

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Rapid radio intra-day variability (IDV) has been discovered in the southern quasar PKS 1257−326. Flux density changes of up to 40% in as little as 45 minutes have been observed in this source, making it, along with PKS 0405−385 and J1819+3845, one of the three most rapid IDV sources known. We have monitored the IDV in this source with the Australia Telescope Compact Array (ATCA) at 4.8 and 8.6 GHz over the course of the last year, and find a clear *annual cycle* in the characteristic time-scale of variability. This annual cycle demonstrates unequivocally that interstellar scintillation (ISS) is the cause of the rapid IDV at radio wavelengths observed in this source. We use the observed annual cycle to constrain the velocity of the scattering material, and the angular size of the scintillating component of PKS 1257−326. We observe a time delay, which also shows an annual cycle, between the similar variability patterns at the two frequencies. We suggest that this is caused by a small ($\sim 10\,\mu$as) offset between the centroids of the 4.8 and 8.6 GHz components, and may be due to opacity effects in the source. The statistical properties of the observed scintillation thus enable us to resolve source structure on a scale of $\sim 10$ microarcseconds, resolution orders of magnitude higher than current VLBI techniques allow. General implications of ISS for the physical properties of sources and the turbulent ISM are discussed.

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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.