Active Galaxies Newsletter	An electronic publication dedicated to the observation and theory of active galaxies
No. 179 — FEBRUARY 2012	Editor: Melanie Gendre (agnews@manchester.ac.uk)

Accepted Abstracts - Submitted Abstracts - Thesis Abstracts
Jobs Adverts - Meetings Adverts - Special Announcements

From the Editor

The Active Galaxies Newsletter is produced monthly. The deadline for contributions is the last day of the month. The Latex macros for submitting abstracts and dissertation abstracts are appended to each issue of the newsletter and are also available on the web page.

As always as editor of the newsletter I am very interested to hear any suggestions or feedback regarding the newsletter. So do not hesitate in emailing me your suggestions.

Many thanks for your continued subscription.

Melanie Gendre

Abstracts of recently accepted papers

Modeling the flaring activity of the high z, hard X-ray selected blazar IGR J22517+2217

G. Lanzuisi[1], A. De Rosa[1], G. Ghisellini[2] , P. Ubertini[1] , F. Panessa[1], M Ajello[3] , L. Bassani[4], Y. Fukazawa[5] , F. D'Ammando[6]

[1] INAF-IASF-Roma, Via del Fosso del Cavaliere 100, I-00133 Roma
[2] INAF-Osservatorio Astronomico di Brera, via E. Bianchi 46, I23807 Merate, Italy
[3] SLAC National Laboratory and Kavli Institute for Particle Astrophysics and Cosmology, 2575 Sand Hill Road, Menlo Park, CA 94025, USA
[4] INAF-IASF-Bologna, Via Gobetti 101, I-4012, Bologna, Italy
[5] Department of Physical Science, Hiroshima University, 1-3-1 Kagamiyama, Higashi-Hiroshima, Hiroshima 739-8526, Japan
[6] INAF-IASF-Palermo, Via U. La Malfa 153, I-90146 Palermo, Italy

We present new Suzaku and Fermi data, and re-analyzed archival hard X-ray data from INTEGRAL and SwiftBAT survey, to investigate the physical properties of the luminous, high-redshift, hard X-ray selected blazar IGR J22517+2217, through the modelization of its broad band spectral energy distribution (SED) in two different activity states. Through the analysis of the new Suzaku data and the flux selected data from archival hard X-ray observations, we build the source SED in two different states, one for the newly discovered flare occurred in 2005 and one for the following quiescent period. Both SEDs are strongly dominated by the high energy hump peaked at $10^{20} - 10^{22}$ Hz, that is at least two orders of magnitude higher than the low energy (synchrotron) one at $10^{11} - 10^{14}$ Hz, and varies by a factor of 10 between the two states. In both states the high energy hump is modeled as inverse Compton emission between relativistic electrons and seed photons produced externally to the jet, while the synchrotron self-Compton component is found to be negligible. In our model the observed variability can be accounted for by a variation of the total number of emitting electrons, and by a dissipation region radius changing from within to outside the broad line region as the luminosity increases. In its flaring activity, IGR J22517+2217 shows one of the most powerful jet among the population of extreme, hard X-ray selected, high redshift blazar observed so far.

Accepted by MNRAS

E-mail contact: giorgio.lanzuisi@iasf-roma.inaf.it,
preprint available at http://arxiv.org/abs/1112.0472

Modeling the Infrared Emission in Cygnus A

G. C. Privon[1,2], S. A. Baum[1,3], C. P. O'Dea[4,5] , J. Gallimore[6,7] , J Noel-Storr[1] , D. J. Axon[4,8] and A. Robinson[4]

[1] Chester F. Carlson Center for Imaging Science, Rochester Institute of Technology, Rochester, NY 14623
[2] Department of Astronomy, University of Virginia, Charlottesville, VA 22904
[3] Radcliffe Institute for Advanced Study. Cambridge, MA 02138
[4] Department of Physics, Rochester Institute of Technology, Rochester, NY 14623
[5] Harvard-Smithsonian Center for Astrophysics. Cambridge, MA 02138
[6] Department of Physics, Bucknell University, Lewisburg, PA 17837
[7] National Radio Astronomy Observatory, Charlottesville, VA, 22904
[8] School of Mathematical and Physical Sciences, University of Sussex, Falmer, Brighton BN1 9RH, UK 4

We present new Spitzer IRS spectroscopy of Cygnus A, one of the most luminous radio sources in the local universe. Data on the inner 20" are combined with new reductions of MIPS and IRAC photometry as well as data from the literature to form a radio through mid-infrared spectral energy distribution (SED). This SED is then modeled as a combination of torus reprocessed active galactic nucleus (AGN) radiation, dust enshrouded starburst, and a synchrotron jet. This combination of physically motivated components successfully reproduces the observed emission over almost 5 dex in frequency. The bolometric AGN luminosity is found to be 10^12 $L_\odot$ (90% of LIR), with a clumpy AGN-heated dust medium extending to $\sim$ 130 pc from the supermassive black hole. Evidence is seen for a break or cutoff in the core synchrotron emission. The associated population of relativistic electrons could in principle be responsible for some of the observed X-ray emission though the synchrotron self-Compton mechanism. The SED requires a cool dust component, consistent with dust-reprocessed radiation from ongoing star formation. Star formation contributes at least 6×10^10 $L_\odot$ to the bolometric output of Cygnus A, corresponding to a star formation rate of $\sim$ 10 $M_\odot$ yr$^{-1.}$

Accepted by ApJ. To Appear in 01 Feb 2012.

E-mail contact: gcp8y@virginia.edu,
preprint available at http://arxiv.org/abs/1201.3319

The X-Ray Variability of a Large, Serendipitous Sample of Spectroscopic Quasars

Robert R. Gibson[1] and W. N. Brandt[2]

[1] Department of Astronomy, University of Washington, Box 351580, Seattle, WA 98195, USA
[2] Department of Astronomy and Astrophysics, The Pennsylvania State University, 525 Davey Laboratory, University Park, PA 16802, USA

We analyze the X-ray variability of 264 Sloan Digital Sky Survey spectroscopic quasars using the *Chandra* public archive. This data set consists of quasars with spectroscopic redshifts out to $z \approx 5$ and covers rest-frame time scales up to Δt_{sys} $\approx$2000 d, with 3 or more X-ray observations available for 82 quasars. It therefore samples longer time scales and higher luminosities than previous large-scale analyses of AGN variablity. We find significant ($\gtrsim 3\sigma$) variation in $\approx$30% of the quasars overall; the fraction of sources with detected variability increases strongly with the number of available source counts up to $\approx$70% for sources with $\geq$1000 counts per epoch. Assuming the distribution of fractional variation is Gaussian, its standard deviation is $\approx$16% on $\gtrsim$1 week time scales, which is not enough to explain the observed scatter in quasar X-ray-to-optical flux ratios as due to variability alone. We find no evidence in our sample that quasars are more variable at higher redshifts ($z > 2$), as has been suggested in previous studies. Quasar X-ray spectra vary similarly to some local Seyfert AGN in that they steepen as they brighten, with evidence for a constant, hard spectral component that is more prominent in fainter stages. We identify one highly-variable Narrow Line Seyfert 1-type spectroscopic quasar in the *Chandra* Deep Field-North. We constrain the rate of kilosecond-timescale flares in the quasar population using $\approx$8 months of total exposure and also constrain the distribution of variation amplitudes between exposures; extreme changes ($> 100\%$) are quite rare, while variation at the 25% level occurs in $<$25% of observations. [O III] λ5007Å emission may be stronger in sources with lower levels of X-ray variability; if confirmed, this would represent an additional link between small-scale (corona) and large-scale (narrow line region) AGN properties.

Accepted by ApJ

E-mail contact: rgibson@astro.washington.edu,
preprint available at arXiv:1110.5341

The Lack of Torus Emission from BL Lacertae Objects: An Infrared View of Unification with WISE

Richard M. Plotkin[1], **Scott F. Anderson**[2], **W. N. Brandt**[3,4], **Sera Markoff**[1], **Ohad Shemmer**[5] **and Jianfeng Wu**[3,4]

[1] Astronomical Institute 'Anton Pannekoek', University of Amsterdam, Science Park 904, 1098 XH, Amsterdam, the Netherlands
[2] Department of Astronomy, University of Washington, Box 351580, Seattle, WA 98195, USA
[3] Department of Astronomy and Astrophysics, Pennsylvania Sate University, 525 Davey Laboratory, University Park, PA 16802, USA
[4] Institute for Gravitation and the Cosmos, Pennsylvania State University, University Park, PA 16802, USA
[5] Department of Physics, University of North Texas, Denton, TX 76203, USA

We use data from the *Wide-Field Infrared Survey Explorer* (*WISE*) to perform a statistical study on the mid-infrared (IR) properties of a large number ($\sim 10^2$) of BL Lac objects — low-luminosity Active Galactic Nuclei (AGN) with a jet beamed toward the Earth. As expected, many BL Lac objects are so highly beamed that their jet synchrotron emission dominates their IR spectral energy distributions. In other BL Lac objects, however, the jet is not strong enough to completely dilute the rest of the AGN emission. We do not see observational signatures of the dusty torus from these weakly beamed BL Lac objects. The lack of observable torus emission is consistent with suggestions that BL Lac objects are fed by radiatively inefficient accretion disks. Implications for the "nature vs. nurture" debate for FR I and FR II radio galaxies are briefly discussed. Our study supports the notion that, beyond orientation, accretion rate plays an important role in AGN unification.

Accepted by ApJ Letters

E-mail contact: r.m.plotkin@uva.nl
Published as Plotkin et al. 2012, ApJL, 745, 27

Examining the Radio-Loud/Radio-Quiet dichotomy with new Chandra and VLA observations of 13 UGC galaxies

P. Kharb[1], **A. Capetti**[2], **D. J. Axon**[1,3], **M. Chiaberge**[4], **P. Grandi**[5], **A. Robinson**[1], **G. Giovannini**[6], **B. Balmaverde**[7], **D. Macchetto**[7] **and R. Montez**[1]

[1] Physics Department, Rochester Institute of Technology, Rochester, NY 14623
[2] Osservatorio Astronomico di Torino, Strada Osservatorio 20, 10025 Pino Torinese, Italy
[3] School of Mathematical and Physical Sciences, Univ. of Sussex, Brighton BN1 9QH, UK
[4] Space Telescope Science Institute, 3700 San Martin Drive, Baltimore, MD 2121
[5] Istituto di Astrofisica Spaziale e Fisica Cosmica, Bologna, Italy
[6] Istituto di Radioastronomia di Bologna, via Gobetti 101, 40129 Bologna, Italy
[7] Universita di Torino, Via P. Giuria 1, Torino I-10125, Italy

We present the results from new $\sim$15 ks *Chandra*-ACIS and 4.9 GHz Very Large Array observations of 13 galaxies hosting low luminosity AGN. This completes the multiwavelength study of a sample of 51 nearby early-type galaxies described in Capetti & Balmaverde (2005, 2006); Balmaverde & Capetti (2006). The aim of the three previous papers was to explore the connection between the host galaxies and AGN activity in a radio-selected sample. We detect nuclear X-ray emission in eight sources and radio emission in all but one (*viz.*, UGC 6985). The new VLA observations improve the spatial resolution by a factor of ten: the presence of nuclear radio sources in 12 of the 13 galaxies confirms their AGN nature. As previously indicated, the behavior of the X-ray and radio emission in these sources depends strongly on the form of their optical surface brightness profiles derived from *Hubble Space Telescope* imaging, *i.e.,* on their classification as "core", "power-law" or "intermediate" galaxies. With more than twice the number of "power-law" and "intermediate" galaxies compared to previous work, we confirm with a much higher statistical significance that these galaxies lie well above the radio-X-ray correlation established in FRI radio galaxies and the low-luminosity "core" galaxies. This result highlights the fact that the "radio-loud/radio-quiet" dichotomy is a function of the host galaxy's optical surface brightness profile. We present radio-optical-X-ray spectral indices for all 51 sample galaxies.

Survival statistics point to significant differences in the radio-to-optical and radio-to-X-ray spectral indices between the "core" and "power-law" galaxies (Gehans Generalized Wilcoxon test probability p for the two classes being statistically similar is $< 10^{-5}$), but not in the optical-to-X-ray spectral indices ($p = 0.25$). Therefore, the primary difference between the "core" and "power-law" galaxies is in their ability to launch powerful radio outflows. This result is consistent with the hypothesis of different formation processes and evolution histories in "core" and "power-law" galaxies: major mergers are likely to have created "core" galaxies, while minor mergers were instrumental in the creation of "power-law" galaxies.

Accepted by Astronomical Journal

E-mail contact: kharb@cis.rit.edu
preprint available at arXiv:1201.4175

Chandra & HST Imaging of the Quasars PKS B0106+013 & 3C 345: Inverse Compton X-rays and Magnetized Jets

P. Kharb[1], M. L. Lister[2], H. L. Marshall[3] and B. S. Hogan[2,4]

[1] Department of Physics, Rochester Institute of Technology, Rochester, NY 14623
[2] Department of physics, Purdue University, West Lafayette, IN 47906
[3] Center for Space Research, Massachusetts Institute of Technology, Cambridge, MA 02139
[4] El Camino College, 16007 Crenshaw Blvd. Torrance, CA 90506; Marymount College, 30800 Palos Verdes Drive East, Rancho Palos Verdes, CA 90275

We present results from deep (∼70 ks) *Chandra* ACIS observations and *Hubble Space Telescope* (HST) ACS F475W observations of two highly optically polarized quasars belonging to the MOJAVE (Monitoring Of Jets in Active galactic nuclei with VLBA Experiments) blazar sample, *viz.,* PKS B0106+013 and 1641+399 (3C 345). These observations reveal X-ray and optical emission from the jets in both sources. X-ray emission is detected from the entire length of the 0106+013 radio jet, which shows clear bends or wiggles - the X-ray emission is brightest at the first prominent kpc jet bend. A picture of a helical kpc jet with the first kpc-scale bend representing a jet segment moving close(r) to our line of sight, and getting Doppler boosted at both radio and X-ray frequencies, is consistent with these observations. The X-ray emission from the jet end however peaks at about 0.4 arcsec (∼3.4 kpc) upstream of the radio hot spot. Optical emission is detected both at the X-ray jet termination peak and at the radio hot spot. The X-ray jet termination peak is found upstream of the radio hot spot by around 0.2 arcsec (∼1.3 kpc) in the short projected jet of 3C 345. HST optical emission is seen in an arc-like structure coincident with the bright radio hot spot, which we propose is a sharp (apparent) jet bend instead of a terminal point, that crosses our line of sight and consequently has a higher Doppler beaming factor. A weak radio hot spot is indeed observed less than 1 arcsec downstream of the bright radio hot spot, but has no optical or X-ray counterpart. By making use of the pc-scale radio and the kpc-scale radio/X-ray data, we derive constraints on the jet Lorentz factors (Γ_{jet}) and inclination angles (θ): for a constant jet speed from pc- to kpc-scales, we obtain a Γ_{jet} of ∼70 for 0106+013, and ∼40 for 3C 345. On relaxing this assumption, we derive a Γ_{jet} of ∼2.5 for both the sources. Upper limits on θ of ~ 13 degrees are obtained for the two quasars. Broad-band (radio-optical-X-ray) spectral energy distribution modeling of individual jet components in both quasars suggests that the optical emission is from the synchrotron mechanism, while the X-rays are produced via the inverse Compton mechanism from relativistically boosted cosmic microwave background seed photons. The locations of the upstream X-ray termination peaks strongly suggest that the sites of bulk jet deceleration lie upstream (by a few kpc) of the radio hot spots in these quasars. These regions are also the sites of shocks or magnetic field dissipation, which reaccelerate charged particles and produce high energy optical and X-ray photons. This is consistent with the best fit SED modeling parameters of magnetic field strength and electron powerlaw indices being higher in the jet termination regions compared to the cores. The shocked jet regions upstream of the radio hot spots, the kpc-scale jet wiggles and a "nose cone" like jet structure in 0106+013, and the V-shaped radio structure in 3C 345, are all broadly consistent with instabilities associated with Poynting flux dominated jets. A greater theoretical understanding and more sensitive numerical simulations of jets spanning parsec- to kpc-scales are needed, however, to make direct quantitative comparsions.

Accepted by Astrophysical Journal

E-mail contact: kharb@cis.rit.edu
preprint available at arXiv:1201.4178

Spectral Analysis of 1H0707−495 with *XMM-Newton*

T. Dauser[1], J. Svoboda[2,3], N. Schartel[3], J. Wilms[1], M. Dovčiak[2], M. Ehle[3], V. Karas[2], M. Santos-Lleó[3], and H. L. Marshall[4]

[1] Dr. Karl Remeis-Observatory and Erlangen Centre for Astroparticle Physics, Sternwartstr. 7, 96049 Bamberg, Germany
[2] Astronomical Institute, Academy of Sciences, Prague, Czech Republic
[3] XMM-Newton Science Operations Centre, ESA, Villafranca del Castillo, Apartado 78, 28691 Villanueva de la Cañada, Spain
[4] Kavli Institute for Astrophysics and Space Research, Massachusetts Institute of Technology, 77 Massachusetts Avenue, Cambridge, MA 02139, USA

We present the results of a 500 ksec long *XMM-Newton* observation and a 120 ksec long quasi-simultaneous *Chandra* observation of the Narrow Line Seyfert 1 galaxy 1H0707−495 performed in 2010 September. Consistent with earlier results by Fabian (2009) and Zoghbi (2010a, the spectrum is found to be dominated by relativistically broadened reflection features from an ionised accretion disc around a maximally rotating black hole. Even though the spectra changed between this observation and earlier *XMM-Newton* observations, the physical parameters of the black hole and accretion disc (i.e., spin and inclination) are consistent between both observations. We show that this reflection spectrum is slightly modified by absorption in a mildly relativistic, highly ionised outflow which changed velocity from around 0.11 c to 0.16 c between 2008 January and 2010 September. Alternative models, in which the spectral shape is dominated by absorption, lead to spectral fits of similar quality, however, the parameters inferred for the putative absorber are unphysical.

Accepted by MNRAS

E-mail contact: thomas.dauser@sternwarte.uni-erlangen.de,
preprint available at http://arxiv.org/abs/1112.1796

Meetings

Tidal Disruption Events and AGN Outbursts

European Space Astronomy Centre (ESAC), Madrid, Spain
25-27 June 2012

Webpage: `http://www.sciops.esa.int/index.php?project=CONF2011&page=TIDALDISRUPTION2012`
Email: `tdconf_esac2012 at sciops.esa.int`

Gigantic X-ray, UV and optical flares have been seen from the nuclei of a small number of galaxies. These extraordinary flares have been interpreted as the tidal disruption of a stellar object by a quiescent black hole, if the hosts were non-active, or as dramatic changes in the accretion environment, if the galaxy appeared as a classical AGN. The very distinctive lightcurves and spectra of tidal disruption events (TDE), predicted in advance by pioneering theoretical work, clearly distinguish them from AGN activity and establish them as an important field of study in their own right. Recent, high-quality observations of TDE, differ in detail from early expectations of thermal emission from steadily returning stellar debris and challenge the sophisticated theoretical and numerical models which are now emerging.

Large and very rare flux changes in known AGN, pose challenges for our understanding of accretion disk processes and the immediate nuclear environment. The discovery of jetted emission from SWIFT J1644+57, probably induced by a stellar disruption, has opened a new window into the phenomenon and provides a further link between tidal disruption events and AGN. Over the next few years, sensitive, large-area, surveys will come on-line and likely detect extragalactic flares in large numbers.

The aim of this workshop is to bring together theorists and observers for a review of previous and current observations and state-of-the-art modelling, helping to develop a strategy for the identification and follow-up of future events.