Active Galaxies Newsletter	*An electronic publication dedicated to the observation and theory of active galaxies*
No. 108 — March 2006	Editor: Rob Beswick (rb@ast.man.ac.uk)

Abstracts - Thesis Abstracts - Jobs - Meetings

From the Editor

The Active Galaxies Newsletter is produced monthly. The deadline for contributions is the last friday 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.

Rob Beswick

An optical-IR jet in 3C 133[1]

David J. E. Floyd [2], Robert Laing [3], Marco Chiaberge [2], Eric Perlman[4], William Sparks[2], Duccio Macchetto[2], Juan Madrid[2], David Axon[5], Christopher P. O'Dea[5], Stefi Baum[5], Alice Quillen[6], George Miley[7] and Alessa ndro Capetti[8]

[1]Based on observations with the NASA/ESA Hubble Space Telescope, obtained at the Space Telescope Science Institute, which is operated by the Association of Universities for Research in Astronomy, Inc. (AURA), under NASA contract NAS5-26555
[2]Space Telescope Science Institute, 3700 San Martin Drive, Baltimore, MD 21218, U.S.A.
[3]ESO, Karl-Schwarzschild-Straße 2, D-85748, Garching-bei-München, Germany
[4]Joint Center for Astrophysics, Physics Dept. University of Maryland, Baltimore County, 1000 Hilltop Circle, Baltimore, MD 21250
[5]Department of Physics, Rochester Institute of Technology, 85 Lomb Memorial Drive, Rochester, NY 14623.
[6]Department of Physics and Astronomy, University of Rochester, Bausch & Lomb Hall, P.O. Box 270171, 600 Wilson Boulevard, Rochester, NY 14627.
[7]Leiden Observatory, P.O. Box 9513, NL-2300 RA Leiden, The Netherlands.
[8]INAF–Osservatorio Astronomico di Torino, Strada Osservatorio 20, 10025 Pino Torinese, Italy.

We report the discovery of a new optical-IR synchrotron jet in the radio galaxy 3C 133 from our HST/NICMOS snapshot survey. The jet and eastern hotspot are well resolved, and visible at both optical and IR wavelengths. The IR jet follows the morphology of the inner part of the radio jet, with three distinct knots identified with features in the radio. The radio-IR SED's of the knots are examined, along with those of two more distant hotspots at the eastern extreme of the radio feature. The detected emi ssion appears to be synchrotron, with peaks in the NIR for all except one case, which exhibits a power-law spectrum throughout.

Accepted by ApJ

E-mail contact: floyd@stsci.edu,
preprint available at http://arxiv.org/abs/astro-ph/0602021

A Short Hard X-ray Flare from the Blazar NRAO 530 Observed by *INTEGRAL*

L. Foschini[1], E. Pian[2], L. Maraschi[3], C.M. Raiteri[4], F. Tavecchio[3], G. Ghisellini[3], G. Tosti[5], G. Malaguti[1], and G. Di Cocco[1]

[1] INAF/IASF-Bologna, Via Gobetti 101, 40129 Bologna (Italy)
[2] INAF, Osservatorio Astronomico di Trieste, Via G.B. Tiepolo 11, 34131, Trieste (Italy)
[3] INAF, Osservatorio Astronomico di Brera, Via Bianchi 46, 23807, Merate (Italy)
[4] INAF, Osservatorio Astronomico di Torino, Via Osservatorio 20, 10025, Pino Torinese (Italy)
[5] Osservatorio Astronomico, Università di Perugia, Via B. Bonfigli, 06126 Perugia (Italy)

We report about a short flare from the blazar NRAO 530 occurred on 17 February 2004 and detected serendipitously by the IBIS/ISGRI detector on board *INTEGRAL*. In the $20-40$ keV energy range, the source, that is otherwise below the detection limit, is detected at a level of $\approx 2\times10^{-10}$ erg cm^{-2} s^{-1} during a time interval of less than 2000 s, which is about a factor 2 above the detection threshold. At other wavelengths, only nearly-simultaneous radio data are available (1 observation at 2 cm on 11 February 2004), indicating a moderate increase of the polarization. This appears to be the shortest time variability episode ever detected in a high luminosity blazar at hard X-rays, unless the blazar is contaminated by the presence of an unknown unresolved rapidly varying source.

Accepted by Astronomy & Astrophysics

E-mail contact: foschini@iasfbo.inaf.it,
preprint available at http://arxiv.org/abs/astro-ph/0601101

The SDSS Quasar Survey: Quasar Luminosity Function from Data Release Three

**Gordon T. Richards,[1],2 Michael A. Strauss,[1] Xiaohui Fan,[3] Patrick B. Hall,[4]
Sebastian Jester,[5],6 Donald P. Schneider,[7] Daniel E. Vanden Berk,[7] Chris Stoughton,[5]
Scott F. Anderson,[8] Robert J. Brunner,[9] Jim Gray,[1]0 James E. Gunn,[1]
Željko Ivezić,[8] Margaret K. Kirkland,[1] G.R. Knapp,[1] Jon Loveday,[1]1
Avery Meiksin,[1]2 Adrian Pope,[2] Alexander S. Szalay,[2] Anirudda R. Thakar,[2]
Brian Yanny,[5] Donald G. York,[1]3, 14 J. C. Barentine,[1]5 Howard J. Brewington,[1]5
J. Brinkmann,[1]5 Masataka Fukugita,[1]6 Michael Harvanek,[1]5 Stephen M. Kent,[5],13
S. J. Kleinman,[1]5 Jurek Krzesiński,[1]5, 17 Daniel C. Long,[1]5 Robert H. Lupton,[1]
Thomas Nash,[5] Eric H. Neilsen, Jr.,[5] Atsuko Nitta,[1]5 David J. Schlegel[1]8
and Stephanie A. Snedden[1]5**

[1] Princeton University Observatory, Peyton Hall, Princeton, NJ 08544.
[2] Department of Physics and Astronomy, The Johns Hopkins University, 3400 North Charles Street, Baltimore, MD 21218-2686.
[3] Steward Observatory, University of Arizona, 933 North Cherry Avenue, Tucson, AZ 85721.
[4] Department of Physics and Astronomy, York University, 4700 Keele Street, Toronto, Ontario, M3J 1P3, Canada.
[5] Fermi National Accelerator Laboratory, P.O. Box 500, Batavia, IL 60510.
[6] School of Physics and Astronomy, Southampton University, Southampton SO17 1BJ, UK.
[7] Department of Astronomy and Astrophysics, The Pennsylvania State University, 525 Davey Laboratory, University Park, PA 16802.
[8] Department of Astronomy, University of Washington, Box 351580, Seattle, WA 98195.
[9] Department of Astronomy, University of Illinois at Urbana-Champaign, 1002 West Green Street, Urbana, IL 61801-3080.
[1]0 Microsoft Research, 301 Howard Street, No. 830, San Francisco, CA 94105.
[1]1 Astronomy Centre, University of Sussex, Falmer, Brighton BN1 9QJ, UK.
[1]2 Institute for Astronomy, Royal Observatory, University of Edinburgh, Blackford Hill, Edinburgh EH9 3HJ, United Kingdom.
[1]3 Department of Astronomy and Astrophysics, The University of Chicago, 5640 South Ellis Avenue, Chicago, IL 60637.
[1]4 Enrico Fermi Institute, The University of Chicago, 5640 South Ellis Avenue, Chicago, IL 60637.
[1]5 Apache Point Observatory, P.O. Box 59, Sunspot, NM 88349.
[1]6 Institute for Cosmic Ray Research, University of Tokyo, 5-1-5 Kashiwa, Kashiwa City, Chiba 277-8582, Japan.
[1]7 Obserwatorium Astronomiczne na Suhorze, Akademia Pedagogicazna w Krakowie, ulica Podchorążych 2, PL-30-084 Kraków, Poland.
[1]8 Lawrence Berkeley National Lab, 1 Cyclotron Road MS 50R-5032, Berkeley, CA 94720-8160.

We determine the number counts and $z = 0$–5 luminosity function for a well-defined, homogeneous sample of quasars from the Sloan Digital Sky Survey (SDSS). We conservatively define the most uniform statistical sample possible, consisting of 15,343 quasars within an effective area of 1622 deg^2 that was derived from a parent sample of 46,420 spectroscopically confirmed broad-line quasars in the 5282 deg^2 of imaging data from SDSS Data Release Three. The sample extends from $i = 15$ to $i = 19.1$ at $z \lesssim 3$ and to $i = 20.2$ for $z \gtrsim 3$. The number counts and luminosity function agree well with the results of the

Two-Degree Field QSO Redshift Survey (2QZ) at redshifts and luminosities where the SDSS and 2QZ quasar samples overlap, but the SDSS data probe to much higher redshifts than does the 2QZ sample. The number density of luminous quasars peaks between redshifts 2 and 3, although uncertainties in the selection function in this range do not allow us to determine the peak redshift more precisely. Our best fit model has a flatter bright end slope at high redshift than at low redshift. For $z < 2.4$ the data are best fit by a redshift-independent slope of $\beta = -3.1$ ($\Phi(L) \propto L^{\beta}$). Above $z = 2.4$ the slope flattens with redshift to $\beta \gtrsim -2.37$ at $z = 5$. This slope change, which is significant at the $\gtrsim$ 5-sigma level, must be accounted for in models of the evolution of accretion onto supermassive black holes.

Accepted by Astron. J.; astro-ph/0601434

E-mail contact: gtr@pha.jhu.edu,
preprint available at ftp://ftp.astro.princeton.edu/gtr/dr3qlf/Feb1306/

The Radius–Luminosity Relationship for Active Galactic Nuclei: The Effect of Host-Galaxy Starlight on Luminosity Measurements

Misty C. Bentz[1], Bradley M. Peterson[1], Richard W. Pogge[1], Marianne Vestergaard[2], and Christopher A. Onken[1,3]

[1] Department of Astronomy, The Ohio State University, 140 West 18th Avenue, Columbus, OH 43210

[2] Steward Observatory, The University of Arizona, 933 North Cherry Avenue, Tucson, AZ 85721

[3] Present address: National Research Council Canada, Herzberg Institute of Astrophysics, 5071 West Saanich Road, Victoria, BC V9E 2E7

We have obtained high resolution images of the central regions of 14 reverberation-mapped active galactic nuclei (AGN) using the *Hubble Space Telescope* Advanced Camera for Surveys High Resolution Camera to account for host-galaxy starlight contamination of measured AGN luminosities. We measure the host-galaxy starlight contribution to the continuum luminosity at 5100 Å through the typical ground-based slit position and geometry used in the reverberation-mapping campaigns. We find that removing the starlight contribution results in a significant correction to the luminosity of each AGN, both for lower luminosity sources, as expected, but also for the higher luminosity sources such as the PG quasars. After accounting for the host galaxy starlight, we revisit the well-known broad-line region radius–luminosity relationship for nearby AGN. We find the power-law slope of the relationship for the Hβ line to be 0.518 ± 0.039, shallower than previously reported and consistent with the slope of 0.5 expected from the naive theoretical assumption that all AGN have, on average, the same ionizing spectrum and the same ionization parameter and gas density in the Hβ line-emitting region.

Accepted by Astrophysical Journal

E-mail contact: bentz@astronomy.ohio-state.edu,
preprint available at http://www.astronomy.ohio-state.edu/ bentz/astroph0602412.html or http://arxiv.org/abs/astro-ph/0602412

Chandra and Spitzer unveil heavily obscured quasars in the SWIRE/Chandra Survey

Maria del Carmen Polletta[1], Belinda J. Wilkes[2], Brian Siana[3], Carol J. Lonsdale[1,4], Roy Kilgard[2], Harding E. Smith[1], Dong-Woo Kim[2], Frazer Owen[5], Andreas Efstathiou[6], Tom Jarrett[4], Gordon Stacey[7], Alberto Franceschini[8], Michael Rowan-Robinson[9], Tom S.R. Babbedge[9], Stefano Berta[8], Fan Fang[3], Duncan Farrah[7], Eduardo González-Solares[10], Glenn Morrison[11], Jason A. Surace[3], Dave L. Shupe[3]

[1] Center for Astrophysics & Space Sciences, University of California, San Diego, La Jolla, CA 92093–0424, USA

[2] Harvard/Smithsonian Center for Astrophysics, 60 Garden Street, Cambridge, MA 02138, USA

[3] Spitzer Science Center, California Institute of Technology, 100-22, Pasadena, CA 91125, USA

[4] Infrared Processing & Analyis Center, California Institute of Technology, 100-22, Pasadena, CA 91125, USA

[5] National Radio Astronomy Observatory[‡], P.O. Box O, Socorro, NM 87801, USA

[6] School of Computer Science and Engineering, Cyprus College, 6 Diogenes Street, Engomi, 1516 Nicosia, Cyprus

[7] Department of Astronomy, Cornell University, Ithaca, NY 14853, USA

[8] Dipartimento di Astronomia, Universitá di Padova, Vicolo dell'Osservatorio 2, I-35122, Padova, Italy

[9] Astrophysics Group, Blackett Laboratory, Imperial College, Prince Consort Road, London, SW7 2BW, UK

[10] Institute of Astronomy, University of Cambridge, Madingley Road, Cambridge, CB3 0HA, UK

[11] Institute for Astronomy, University of Hawaii, and Canada-France-Hawaii Telescope, Kamuela, Hawaii 96743-8432, USA

Using the large multi-wavelength data set in the *Chandra*/SWIRE Survey (0.6 deg^2 in the Lockman Hole), we show evidence for the existence of highly obscured (Compton-thick) AGN, estimate a lower limit to their surface density and characterize their multi-wavelength properties. Two independent selection methods based on the X-ray and infrared spectral properties are presented. The two selected samples contain 1) 5 X-ray sources with hard X-ray spectra and column densities $\geq 10^{24}$cm^{-2}, and 2) 120 infrared sources with red and AGN-dominated infrared spectral energy distributions (SEDs). We estimate a surface density of at least 25 Compton-thick AGN deg^{-2} detected in the infrared in the *Chandra*/SWIRE field of which ∼40% show distinct AGN signatures in their optical/near-infrared SEDs, the remainings being dominated by the host-galaxy emission. Only ∼33% of all Compton-thick AGN are detected in the X-rays at our depth (F(0.3–8 keV)>10^{-15}erg cm^{-2} s^{-1}).

We report the discovery of two sources in our sample of Compton-thick AGN, SWIRE_J104409.95+585224.8 (z=2.54) and SWIRE_J104406.30+583954.1 (z=2.43), which are the most luminous Compton-thick AGN at high-z currently known. The properties of these two sources are discussed in detail with an analysis of their spectra, SEDs, luminosities and black-hole masses.

Accepted by ApJ (to appear in May 2006 issue, vol. 642)

E-mail contact: mcp@auriga.ucsd.edu, preprint available at http://arxiv.org/abs/astro-ph/0602228

Radiative Transfer Modeling of Three-Dimensional Clumpy AGN Tori and its Application to NGC 1068

Sebastian F. Hönig[1], **Thomas Beckert**[1], **Keiichi Ohnaka**[1], **Gerd Weigelt**[1]

[1] Max-Planck-Insitut für Radioastronomie, Auf dem Hügel 69, 53121 Bonn, Germany

Recent observations of NGC 1068 and other AGN support the idea of a geometrically and optically thick dust torus surrounding the central supermassive black hole and accretion disk of AGN. In type 2 AGN, the torus is seen roughly edge-on, leading to obscuration of the central radiation source and a silicate absorption feature near 10 μm. While most of the current torus models distribute the dust smoothly, there is growing evidence that the dust must be arranged in clouds. We describe a new method for modeling near- and mid-infrared emission of 3-dimensional clumpy tori using Monte Carlo simulations. We calculate the radiation fields of individual clouds at various distances from the AGN and distribute these clouds within the torus region. The properties of the individual clouds and their distribution within the torus are determined from a theoretical approach of self-gravitating clouds close to the shear limit in a gravitational potential. We demonstrate that clumpiness in AGN tori can overcome the problem of over-pronounced silicate features. Finally, we present model calculations for the prototypical Seyfert 2 galaxy NGC 1068 and compare them to recent high-resolution measurements. Our model is able to reproduce both the SED and the interferometric observations of NGC 1068 in the near- and mid-infrared.

Accepted by A&A

E-mail contact: shoenig@mpifr-bonn.mpg.de, preprint available at http://arxiv.org/abs/astro-ph/0602494

Chandra Observations of the Highest Redshift Quasars from the Sloan Digital Sky Survey

Ohad Shemmer[1], **W. N. Brandt**[1], **Donald P. Schneider**[1], **Xiaohui Fan**[2], **Michael A. Strauss**[3], **Aleksandar M. Diamond-Stanic**[2], **Gordon T. Richards**[3], **Scott F. Anderson**[4], **James E. Gunn**[3], **and Jon Brinkmann**[5]

[1] Department of Astronomy & Astrophysics, The Pennsylvania State University, University Park, PA 16802
[2] Steward Observatory, University of Arizona, 933 North Cherry Avenue, Tucson, AZ 85721
[3] Princeton University Observatory, Peyton Hall, Princeton, NJ 08544
[4] Department of Astronomy, University of Washington, Box 351580, Seattle, WA 98195
[5] Apache Point Observatory, P.O. Box 59, Sunspot, NM 88349-0059

We present new *Chandra* observations of 21 $z > 4$ quasars, including 11 sources at $z > 5$. These observations double the number of X-ray detected quasars at $z > 5$, allowing investigation of the X-ray spectral properties of a substantial sample of quasars at the dawn of the modern Universe. By jointly fitting the spectra of 15 $z > 5$ radio-quiet quasars (RQQs), including sources from the *Chandra* archive, with a total of 185 photons, we find a mean X-ray power-law photon index of $\Gamma = 1.95^{+0.30}_{-0.26}$, and a mean neutral intrinsic absorption column density of $N_{\rm H} \lesssim 6{\times}10^{22}\,{\rm cm}^{-2}$. These results show that quasar X-ray spectral properties have not evolved up to the highest observable redshifts. We also find that the mean optical–X-ray spectral slope ($\alpha_{\rm ox}$) of optically-selected $z > 5$ RQQs, excluding broad absorption line quasars, is $\alpha_{\rm ox} = -1.69 \pm 0.03$, which is consistent with the value predicted from the observed relationship between $\alpha_{\rm ox}$ and ultraviolet luminosity. Four of the sources in our sample are members of the rare class of weak emission-line quasars, and we detect two of them in X-rays. We discuss the implications our X-ray observations have for the nature of these mysterious sources and, in particular, whether their weak-line spectra are a consequence of continuum boosting or a deficit of high-ionization line emitting gas.

Accepted by The Astrophysical Journal
E-mail contact: ohad@astro.psu.edu, preprint available at http://arxiv.org/abs/astro-ph/0602442

Flat-spectrum symmetric objects with ~ 1 kpc sizes I. The candidates

Pedro Augusto,[1] J. Ignacio Gonzalez-Serrano,[2] Ismael Perez-Fournon,[3] and Peter N. Wilkinson,[4]

[1] Universidade da Madeira, Centro de Ciências Matemáticas, Caminho da Penteada, 9000-390 Funchal, Portugal
[2] Instituto de Física de Cantabria (CSIC-Universidad de Cantabria), 39005 Santander, Spain
[3] Instituto de Astrofísica de Canarias, c/ Via Láctea s/n, 38200 La Laguna, Tenerife, Spain
[4] University of Manchester, Jodrell Bank Observatory, Macclesfield, Cheshire SK11 9DL, UK

In order to understand the origin and evolution of radio galaxies, searches for the youngest such sources have been conducted. Compact-medium symmetric objects (CSO-MSOs) are thought to be the earliest stages of radio sources, with possible ages of $\lesssim 10^3$ yrs for CSOs (< 1 kpc in size) and 10^4–10^5 yrs for MSOs (1–15 kpc). From a literature selection in heterogeneous surveys, we have established a sample of 37 confirmed CSOs. In addition, we only found three confirmed flat-spectrum MSOs in the literature. The typical CSO resides on a $z \lesssim 0.5$ galaxy, has a flat radio spectrum ($\alpha_{thin} < 0.5$; $S_\nu \propto \nu^{-\alpha}$), is < 0.3 kpc in size, has an arm length ratio ≤ 2, and well-aligned ($\theta \leq 20$ °) opposite lobes with a flux den sity ratio ≤ 10. In order to populate the 0.3–1 kpc size range (large CSOs) and also in order to find more flat-spectrum MSOs, we have built a sample of 157 radio sources with $\alpha_{1.40}^{4.85} < 0.5$ that were resolved with the VLA-A 8.4 GHz. As first results, we have 'rediscovered' nine of the known CSO/MSOs while identifying two new ~ 14 kpc MSOs and two candidate CSO/ MSOs (which only lack redshifts for final classification). We were able to reject 61 of the remaining 144 objects from literature information alone. In the series of papers that starts with this one we plan to classify the remaining 83 CSO/MSO candidate s (thanks to radio and optical observations) as well as characterize the physical properties of the (likely) many 0.3–15 kpc flat-spectrum CSO/MSOs to be found.

Accepted by M.N.R.A.S.

E-mail contact: augusto@uma.pt,
preprint available at astroph/0602511

The AGN Contribution to the Mid-IR Emission of Luminous Infrared Galaxies

K. Brand[1], A. Dey[1], D. Weedman[2], V. Desai[3], E. Le Floc'h[4,10], B. T. Jannuzi[1], B. T. Soifer[3,5], M. J. I. Brown[6], P. Eisenhardt[7], V. Gorjian[7], C. Papovich[4,8], H. A. Smith[9], S. P. Willner[9], R. J. Cool[4]

[1] National Optical Astronomy Observatory, 950 North Cherry Avenue, Tucson, AZ 85726; brand@noao.edu
[2] Department of Astronomy, Cornell University, 610 Space Sciences Building, Ithaca, NY 14853
[3] Division of Physics, Mathematics and Astronomy, California Institute of Technology, 320-47, Pasadena, CA 91125
[4] Steward Observatory, University of Arizona, 933 North Cherry Avenue, Tucson, AZ 85721
[5] Spitzer Science Center, California Institute of Technology, 323-6, Pasadena, CA 91125
[6] Princeton University Observatory, Peyton Hall, Princeton, NJ 08544
[7] Jet Propulsion Laboratory, California Institute of Technology, 169-327, Pasadena, CA 91109
[8] Spitzer Fellow
[9] Harvard Smithsonian Center for Astrophysics, 60 Garden Street, Cambridge, MA 02138
[10] Associated to Observatoire de Paris, GEPI, 92195 Meudon, France

We determine the contribution of AGN to the mid-IR emission of luminous infrared galaxies (LIRGs) at $z > 0.6$ by measuring the mid-IR dust continuum slope of 20,039 mid-IR sources. The 24 μm sources are selected from a *Spitzer/MIPS* surve y of the NOAO Deep Wide-Field Survey Boötes field and have corresponding 8 μm data from the *IRAC* Shallow Survey. There is a clear bimodal distribution in the 24 μm to 8 μm flux ratio. The X-ray detected sources fa ll within the peak corresponding to a flat spectrum in νf_ν, implying that it is populated by AGN-dominated LIRGs, whereas the peak corresponding to a higher 24 μm to 8 μm flux ratio is likely due to LIRGs whose infrared emi ssion is powered by starbursts. The 24 μm emission is increasingly dominated by AGN at higher 24 μm flux densities (f_{24}): the AGN fraction of the $z > 0.6$ sources increases from 9% at $f_{24} \approx 0.35$ mJy to 74±20% at $f_{24} \approx 3$ mJy in good agreement with model predictions. Deep 24 μm, small area surveys, like GOODS, will be strongly dominated by starburst galaxies. AGN are responsible for ∼3-7% of the total 24 μm background.

Accepted by ApJ

E-mail contact: brand@noao.edu,
preprint available at http://xxx.lanl.gov/abs/astro-ph/0602198

The Chandra XBoötes Survey - III: Optical and Near-IR Counterparts

Kate Brand[1], Michael J. I. Brown[2], Arjun Dey[1], Buell T. Jannuzi[1], Christopher S. Kochanek[3], Almus T. Kenter[4], Daniel Fabricant[4], Giovanni G. Fazio[4], William R. Forman[4], Paul J. Green[4], Christine J. Jones[4], Brian R. McNamara[3], Stephen S. Murray[4], Joan R. Najita[1], Marcia Rieke[5], Joseph C. Shields[6], Alexey Vikhlinin[4]

[1] National Optical Astronomy Observatory, Tucson, AZ 85726-6732; brand@noao.edu
[2] Princeton University Observatory, Peyton Hall, Princeton, NJ 08544
[3] Department of Astronomy, The Ohio State University, 140 West 18th Avenue, Columbus, OH 43210
[4] Harvard-Smithsonian Center for Astrophysics, 60 Garden Street, Cambridge, MA 02138
[5] Steward Observatory, University of Arizona, 933 North Cherry Avenue, Tucson, AZ 85721
[6] Department of Physics and Astronomy, Ohio University, Athens, OH 45701

The XBoötes Survey is a 5-ks Chandra survey of the Boötes Field of the NOAO Deep Wide-Field Survey (NDWFS). This survey is unique in that it is the largest (9.3 deg^2), contiguous region imaged in X-ray with complementary deep optical and near-IR observations. We present a catalog of the optical counterparts to the 3,213 X-ray point sources detected in the XBoötes survey. Using a Bayesian identification scheme, we successfully identified optical counterparts for 98% of the X-ray point sources. The optical colors suggest that the optically detected galaxies are a combination of z <1 massive early-type galaxies and bluer star-forming galaxies whose optical AGN emission is faint or obscured, whereas the majority of the optically detected point sources are likely quasars over a large redshift range. Our large area, X-ray bright, optically deep survey enables us to select a large sub-sample of sources (773) with high X-ray to optical flux ratios (f_x/f_o >10). These objects are likely high re dshift and/or dust obscured AGN. These sources have generally harder X-ray spectra than sources with 0.1<f_x/f_o <10. Of the 73 X-ray sources with no optical counterpart in the NDWFS catalog, 47 are truly optically blank down to R ~25.5 (the ave rage 50% completeness limit of the NDWFS R-band catalogs). These sources are also likely to be high redshift and/or dust obscured AGN.

Accepted by ApJ

E-mail contact: brand@noao.edu, preprint available at http://xxx.lanl.gov/abs/astro-ph/0512343

Tracing the Nuclear Accretion History of the Red Galaxy Population

Kate Brand[1], Arjun Dey[1], Michael J. I. Brown[2], Casey R. Watson[3], Buell T. Jannuzi[1], Joan R. Najita[1], Christopher S. Kochanek[4], Joseph C. Shields[5], Giovani G. Fazio[6], William R. Forman[6], Paul J. Green[6], Christine J. J ones[6], Almus T. Kenter[6], Brian R. McNamara[5], Steve S. Murray[6], Marcia Rieke[7], Alexey Vikhlinin[6]

[1] National Optical Astronomy Observatory, Tucson, AZ 85726-6732; brand@noao.edu
[2] Princeton University Observatory, Peyton Hall, Princeton, NJ 08544
[3] Department of Physics, The Ohio State University, 174 West 18th Avenue, Columbus, OH 43210
[4] Department of Astronomy, The Ohio State University, 140 West 18th Avenue, Columbus, OH 43210
[5] Department of Physics and Astronomy, Ohio University, Athens, OH 45701
[6] Harvard-Smithsonian Center for Astrophysics, 60 Garden Street, Cambridge, MA 02138
[7] Steward Observatory, University of Arizona, 933 North Cherry Avenue, Tucson, AZ 85721

We investigate the evolution of the hard X-ray luminosity of the red galaxy population using a large sample of 3316 red galaxies selected over a wide range in redshift ($0.3 < z < 0.9$) from a 1.4 deg^2 region in the Boötes field of the NOAO Deep Wide-F ield Survey (NDWFS). The red galaxies are early-type, bulge-dominated galaxies and are selected to have the same evolution corrected, absolute R-band magnitude distribution as a function of redshift to ensure we are tracing the evolution in the X-ray p roperties of a comparable optical population. Using a stacking analysis of 5-ks Chandra/ACIS observations within this field to study the X-ray emission from these red galaxies in three redshift bins, we find that the mean X-ray luminosity increases as a function of redshift. The large mean X-ray luminosity and the hardness of the mean X-ray spectrum suggests that the X-ray emission is largely dominated by AGN rather than stellar sources. The hardness ratio can be reproduced by either an absorbed ($N_H \approx 2 \times 10^{22}\,\mathrm{cm}^{-2}$) Γ=1.7 power-law source, consistent with that of a population of moderately obscured Seyfert-like AGN, or an unabsorbed Γ=0.7 source suggesting a radiatively inefficient accretion flow (e.g., an advect ion-dominated accretion flow). We also find that the emission from this sample of red galaxies constitutes at least 5% of the hard X-ray background. These results suggest a global decline in the mean AGN activity of normal early-type galaxies from $z \sim 1$ to the present, which indicates that we are witnessing the tailing off of the accretion activity onto SMBHs in early-type galaxies since the quasar epoch.

Accepted by ApJ (Brand et al. 2005, ApJ, 626, 723)

E-mail contact: brand@noao.edu, preprint available at http://xxx.lanl.gov/abs/astro-ph/0503156

The X-ray–to–Optical Properties of Optically-Selected Active Galaxies Over Wide Luminosity and Redshift Ranges

A. T. Steffen[1], I. Strateva[1], W. N. Brandt[1], D. M. Alexander[2], A. M. Koekemoer[3], B. D. Lehmer[1], D. P. Schneider[1], & C. Vignali[4,5]

[1] Department of Astronomy and Astrophysics, 525 Davey Laboratory, Pennsylvania State University, University Park, PA 16802.
[2] Institute of Astronomy, Madingley Road, Cambridge CB3 0HA, UK.
[3] Space Telescope Science Institute, 3700 San Martin Drive, Baltimore, MD 21218.
[4] Dipartimento di Astronomia, Università degli Studi di Bologna, Via Ranzani 1, 40127 Bologna, Italy.
[5] INAF-Osservatorio Astronomico di Bologna, Via Ranzani 1, 40127 Bologna, Italy.

We present partial-correlation analyses that examine the strengths of the relationships between $l_{2500\ \mathrm{\AA}}$, $l_{2\ \mathrm{keV}}$, α_{OX}, and redshift for optically-selected AGNs. We extend the work of Strateva et al. (2005), that analyzed optically-selected AGNs from the Sloan Digital Sky Survey (SDSS), by including 52 moderate-luminosity, optically-selected AGNs from the COMBO-17 survey with corresponding deep (≈ 250 ks to 1 Ms) X-ray observations from the Extended *Chandra* Deep Field-South. The COMBO-17 survey extends ~ 3 magnitudes deeper than the SDSS and probes the moderate-luminosity AGNs that numerically dominate the AGN population in the Universe. We also include recently published observations of 19 high-redshift, optically-selected AGNs, and 46 luminous, low-redshift AGNs from the Bright Quasar Survey. The full sample used in our analysis consists of 333 AGNs, extending out to $z \sim 6$, with 293 (88%) having X-ray detections. The sample spans five decades in UV luminosity and four decades in X-ray luminosity. We confirm that α_{OX} is strongly anti-correlated with $l_{2500\ \mathrm{\AA}}$ (13.6σ), the highest significance found for this relation to date, and find evidence suggesting that the slope of this relation may be dependent on $l_{2500\ \mathrm{\AA}}$. We find that no significant correlation exists between α_{OX} and redshift (1.3σ), and constrain the maximum evolution of AGN UV-to-X-ray flux ratios to be less than 30% (1σ) out to $z = 5$. Using our sample's high X-ray detection fraction, we also find a significant anti-correlation (3.0σ) between α_{OX} and $l_{2\ \mathrm{keV}}$. We make comparisons to earlier studies on this topic and discuss implications for X-ray vs. optical luminosity functions.

Accepted for publication by the Astronomical Journal

E-mail contact: steffen@astro.psu.edu (Aaron Steffen),
preprint available at http://arxiv.org/abs/astro-ph/0602407

An Exploratory *Chandra* Survey of a Well-Defined Sample of 35 Large Bright Quasar Survey Broad Absorption Line Quasars

S. C. Gallagher,[1] W. N. Brandt,[2] G. Chartas,[2] R. Priddey,[3] G. P. Garmire,[2] & R. M. Sambruna[4]

[1] Department of Physics & Astronomy, University of California – Los Angeles, 430 Portola Plaza, Box 951547, Los Angeles CA, 90095–1547, USA
[2] Department of Astronomy and Astrophysics, The Pennsylvania State University, University Park, PA 16802, USA
[3] Centre for Astrophysics Research, University of Hertfordshire, College Lane, Hatfield, Hertfordshire AL10 9AB, UK
[4] NASA's Goddard Space Flight Center, Code 661, Greenbelt, MD 20771, USA

We present 4–7 ks Chandra observations of 35 Broad Absorption Line (BAL) quasars from the Large Bright Quasar Survey, the largest sample of sensitive, 0.5–8.0 keV X-ray observations of this class of quasars to date. The limited ranges in both redshift ($z = 1.42 - 2.90$) and UV luminosity (a factor of ~ 12) of the sample also make it relatively uniform. Of 35 targets, 27 are detected for a detection fraction of 77%, and we confirm previous studies that find BAL quasars to be generally X-ray weak. Five of the eight non-detections are known low-ionization BAL quasars, confirming reports of extreme X-ray weakness in this subset (~ 10% of optically selected BAL quasars). Those BAL quasars with the hardest X-ray spectra are also the X-ray weakest, consistent with the interpretation that intrinsic absorption is the primary cause of X-ray weakness in this class of quasars as a whole. Furthermore, the observed trend is not consistent with simple neutral absorption, supporting findings from spectroscopic observations of individual targets that BAL quasars typically exhibit complex X-ray absorption (e.g., partially covering or ionized absorbers). Assuming normal quasar X-ray continua and using the hard-band (observed-frame 2–8 keV) X-ray flux to 'correct' for the effects of intrinsic absorption at softer energies increases the relative X-ray-to-optical flux ratios to much closer to the range for normal quasars, further indicating that high-ionization BAL quasars are typically neither intrinsically X-ray weak nor suffer from Compton-thick absorption. In general, we find no evidence for correlations between X-ray weakness and UV absorption-line properties, with the exception of a likely correlation between the maximum outflow velocity of CIV absorption and the magnitude of X-ray weakness. We discuss the implications of our results for disk-wind

models of BAL outflows in quasars.

Accepted by Astrophys. J.

E-mail contact: sgall@astro.ucla.edu,
preprint available at http://arxiv.org/abs/astro-ph/0602550

Spectroscopic Confirmation of a Large AGN Population in Clusters of Galaxies

Paul Martini[1,2], Daniel D. Kelson[3], Eunhyeuk Kim[1], John S. Mulchaey[3], and Alex A. Athey[3]

[1] Harvard-Smithsonian Center for Astrophysics, 60 Garden Street, Cambridge, MA 02138
[2] Department of Astronomy, The Ohio State University, 140 West 18th Avenue, Columbus, OH 43210
[3] Carnegie Observatories, 813 Santa Barbara Street, Pasadena, CA 91101

We have completed a spectroscopic survey of X-ray point sources in eight low-redshift clusters of galaxies ($0.05 < z < 0.31$) and have identified 40 cluster members with broad-band (0.3–8 keV) X-ray luminosities between $L_X = 8 \times 10^{40}$ and 4×10^{43} erg s^{-1}. There are between two and ten X-ray sources per cluster. We use visible-wavelength emission lines, X-ray spectral shapes, and multiwavelength flux ratios to determine that at least 35 of these galaxies are Active Galactic Nuclei (AGN). From our spectroscopic survey of other candidate cluster members we estimate that the AGN fraction f_A is $\sim 5\%$ for cluster galaxies more luminous than $M_R = -20$ mag hosting AGN with broad-band X-ray luminosities above $L_X = 10^{41}$ erg s^{-1}, or $f_A(M_R < -20; L_X > 10^{41}) \sim 5\%$. We stress that additional, lower-luminosity AGN are expected to be present in the $M_R < -20$ mag cluster members. Our data unambiguously demonstrate that cluster galaxies host AGN more frequently than previously expected. Only four of these galaxies have obvious visible-wavelength AGN signatures, even though their X-ray luminosities are too high for their X-ray emission to be due to populations of low-mass X-ray binaries or hot, gaseous halos. We attribute the significant difference in visible and X-ray AGN identification to dilution of low-luminosity AGN spectral signatures by host galaxy starlight and/or obscuration of accretion onto the central, supermassive black hole.

Accepted by ApJ

E-mail contact: martini@astronomy.ohio-state.edu,
preprint available as astro-ph/0602496

Meetings

First Announcement

The 8th European VLBI Network Symposium on New Developments in VLBI Science and Technology and EVN Users Meeting Toruń, Poland, 26-29 September 2006

Webpage: http://www.astro.uni.torun.pl/evn2006/
email: evn2006@astro.uni.torun.pl

The 8th EVN Symposium will be hosted by Toruń Radio Astronomy Observatory of the Nicolaus Copernicus University in Toruń, a mediaeval city (population 210.000) in northern Poland included in the UNESCO World Heritage List.

The symposium will have an informal character. It will consist of a number of invited reviews followed by oral contributions grouped in sessions on extragalactic objects, stars, instrumentation, and techniques. Space for presenting posters will also be provided. Traditionally, the EVN Users Meeting will be one of the items on the agenda.

The Symposium will be divided into four sessions devoted to:

1. Extragalactic objects (AGNs, gravitational lenses, megamasers)
2. Stars and other galactic objects
3. Instruments and instrumentation used for VLBI including e-VLBI
4. New techniques including geodetic VLBI, software development, etc.

Scientific topics:
VLBI surveys
Millimeter VLBI
Superluminal motion
AGN polarized emission
AGN jet physics
Gravitational lenses
Lacertides
GPS/CSS sources
Starburst galaxies
Low luminosity radio-loud AGNs
Megamasers
Proper motions of Local Group of galaxies
HI absorptions
Galactic Masers
Supernovae and their remnants
Active stars

Invited speakers:
Robert Beswick
Marco Bondi
Andreas Brunthaler
Riccardo Cesaroni
Sean Dougherty
Phil Edwards
Denise Gabuzda
Mike Garrett
Gabriele Giovannini
Thomas Krichbaum
Huib van Langevelde
Andrei Lobanov
Raffaella Morganti

Tom Muxlow
Ylva Pihlstrom
Cormac Reynolds
Anita Richards
Carlo Stanghellini
Olaf Wucknitz

Venue and accommodation:
The Symposium will be held at the Conference Hall of Hotel Filmar in Toruń. We have made a block reservation for the participants of the Symposium and we have got a substantial discount on room prices. Please DO NOT make any reservations using the Hotel 's website. Instead, please go to the Symposium's website (see the address below), click on "Venue", download the reservation form, fill it and send back to the hotel.

Registration:
If you are interested in the 8th EVN Symposium (regardless of whether you already decided to participate or not) please fill the pre-registration form at your earliest convenience. The form is very short and easy to fill as it contains only basic informat ion. Filling it early would help the LOC to estimate the number of participants and to arrange the facilities, transportation, etc. accordingly. The "full" registration is to be opened shortly after the Second Announcement is circulated.

The Symposium will be sponsored by RadioNet. Thus, it will be possible to grant a travel assistance for a limited number of younger participants (students and PhD students). The travel grant Application Form will be available during the full-registration – see "Important dates" section.

Important dates:
10th Feb. - First Announcement. Pre-registration opens.
April - Second Announcement (with travel tips and a draft Scientific Programme). Registration opens.
July - Third Announcement (with the Scientific Programme).
20th Aug. - Deadline for hotel reservations
1st Sep. - (VERY) hard deadline for submission of abstracts. Registration closed.
Early Sep. - Final Announcement (with the final programme of the Symposium).
25th Sep. - Arrival of participants.
26th Sep. - Symposium begins.
29th Sep. - End of Symposium.
20th Oct. - Deadline for submission of contributions to the Proceedings.

Scientific Organising Committee: Willem Baan (WSRT/ASTRON, NL)
Rafael Bachiller (IGN, ES)
Roy Booth (OSO, SE)
Patrick Charlot (Obs. Bordeaux, FR)
Phillip Diamond (MERLIN/JBO, UK)
Mike Garrett (JIVE, NL)
Xiaoyu Hong (SHAO, CN)
Justin Jonas (HRAO, ZA)
Andrzej Kus - Co-Chair (TCfA, PL)
Franco Mantovani - Co-Chair (IRA, IT)
Andrzej Marecki - secretary (TCfA, PL)
Hans Olofsson (OSO, SE)
Wolfgang Schlueter (IfAG, DE)
Merja Tornikoski (MRO/HUT, FI)
Na Wang (UAO, CN)
Anton Zensus (MPIfR, DE)

Contact:
Website: http://www.astro.uni.torun.pl/evn2006/
email: evn2006@astro.uni.torun.pl
Fax: +48 56 611 30 09

Galaxy Mergers: - *From the Local Universe to the Red Sequence*

2006 Fall Space Telescope Science Institute Mini-Workshop
Baltimore, MD 21218
USA
1-3 November 2006
First Announcement

Science Organizing Committee
B. Rothberg - Chair (STScI)
P. Goudfrooij (STScI)
J. Hibbard (NRAO)
B. Mobasher (STScI)
T. Puzia (STScI)
B. Whitmore (STScI)

Conference Rationale:
The link between star-formation and galaxy evolution is of considerable interest in the context of results from recently completed deep imaging and spectroscopic surveys. A recent flurry of papers in the last two years have presented results which indicate that enough so-called "red and dead" early-type galaxies exist to form the Red Sequence as far back as z$\sim$1. These studies suggest that non-dissipative (or "dry") merging is the key to forming massive early-type galaxies. It is further postulated that gas-rich (or "wet") mergers are unable to account for the most massive "red and dead" galaxies. Some evidence to support this can be found in numerical simulations of mergers. Yet, other lines of evidence support the importance of gas-rich merging: massive disk galaxies with large reservoirs of gas at z $>$ 1 with colors that place them on the Red Sequence, nearby giant ellipticals which show the presence of both intermediate-age stellar populations and intermediate-age globular clusters and merger simulations which indicate that gaseous disks are needed in the central regions of mergers in order for these objects to have the same dynamical properties as elliptical galaxies. Taken together, these results seem to point towards a serious dichotomy in our view of mergers and galaxy evolution. How do these competing merger pictures fit into our overall understanding of galaxy evolution, and can the observed Color-Magnitude Diagram be reconciled with predictions made by λ-CDM cosmology and hierarchical assembly? Answering these questions and addressing the dichotomy in the merger picture is critical to a more comprehensive understanding of galaxy formation and evolution.

We will hold a 2.5 day workshop to address these important issues, both in an observational and theoretical context. In addition to invited talks, the conference will include contributed talks and posters.

Registration Deadline: September 1, 2006

Topics to be Addressed:
- The Red Sequence and Blue Cloud: Observation and Theory
- Star Formation: Triggering mechanisms (Shocks, Dissipation, Quenching & AGN outflows)
- Stellar Populations: Properties, Synthesis Models, Passive vs. Active Evolution, Ways to Reach the Red Sequence
- Dynamical Properties of Mergers: Scaling Relations (Fundamental Plane, Phase-space, M_{BH}-σ)
- Merger Morphology: Shape, Connection to the Hubble Sequence, Dissipative vs. Non-Dissipative Merging

Contact Information:
Quindairian Gryce - gryce@stsci.edu (Workshop Administrative Coordinator)
B. Rothberg - rothberg@stsci.edu (SOC Chair)

The Active Galaxies Newsletter is available on the World Wide Web. You can access it via the University of Manchester home page :- http://www.ast.man.ac.uk/~rb/agn/
If you move or your e-mail address changes, please send the editor your new address. If the Newsletter repeatedly bounces back from an address then that address is deleted from the mailing list.