Active Galaxies Newsletter	*An electronic publication dedicated to the observation and theory of active galaxies*
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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.

In the last few months I have re-furbished the previously dated web-pages to what are hopefully much more useful pages. Please do let me know if you have any suggested improvements to these pages or the newsletter itself. In particular almost all issues 99 of the newsletter, so far produced, are now available as html, pdf, ps.gz and tex formats on the web. Plus I have begun to transfer all special announcements such as meetings, job adverts and thesis abstracts to their only sub-pages, in addition to them being sent out in the newsletter itself. These new pages will be updated as soon as possible after such announcements are received so please do continue to advertise any relevant upcoming events here.

The next issue will be the 100th issue of the Newsletter with the October issue being its 9th birthday!. The subscription to the Newsletter is still growing every month with currently around 600 subscribers.

Rob Beswick

Abstracts of recently accepted papers

Mapping the Kinematics of the Narrow-Line Region in the Seyfert Galaxy NGC 4151[1]

V. Das[2], D.M. Crenshaw[2,3], J.B. Hutchings[4], R.P. Deo[2,5], S.B. Kraemer[6], T.R. Gull[7], M.E. Kaiser[8], C.H. Nelson[9], & D. Weistrop[10]

[1]Based on observations made with the NASA/ESA Hubble Space Telescope. STScI is operated bt the Association of Universities for Research in Astronomy, Inc., under NASA contract NAS5-26555. These observations are associated with proposal GTO-8473
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Using *The Hubble Space Telescope's* Space TelescopeImaging Spectrograph (*HST's STIS*), observations of the [O III] emission fromthe narrow-line region (NLR) of NGC 4151 were obtained and radial velocities determined. Five orbits of *HST* time were used to obtain spectra at five parallel slit configurations, at a position angle of 58°, with spatial resolution $0\overset{''}{.}2$ across and $0\overset{''}{.}1$ along each slit. A spectral resolving power ($\Delta\lambda/\lambda$) of ~9,000 with the G430M grating gave velocity measurements accurate to ~34km s^{-1}. A kinematic model was generated to match the radial velocities, for comparison to previous kinematic models of biconical radial outflow developed for low-dispersion spectra at two slit positions. The new high-resolution spectra permit the measurement of accurate velocity dispersions for each radial-velocity component. The full-width at half-maximum (FWHM) reaches a maximum of 1000km s^{-1} near the nucleus, and generally decreases with increasing distance to about 100km s^{-1} in the extended narrow-line region (ENLR), starting at about $6''$ from the nucleus. In addition to the bright emission knots, which generally fit our model, there are faint high velocity clouds which do not fit the biconical outflow pattern of our kinematic model. These faint clouds occur at the turnover points of the outflowing bright clouds. We suggest possible scenarios that could explain these rogue clouds: (1) backflow resulting from shocks and (2) outflow outside of the bicones, although the latter does not explain how the knots are ionized and accelerated. A comparison of our observations with a high-resolution radio map shows that there is no evidence that the kinematics of the NLR clouds are affected by the radio lobes that comprise the inner jet.

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For high resolution figures, you can use the following URLs instead:

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http://www.chara.gsu.edu/\~crenshaw/NGC4151_kinematics.ps
http://www.chara.gsu.edu/\~crenshaw/NGC4151_kinematics.pdf
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E-mail contact: das@chara.gsu.edu
E-mail contact: crenshaw@chara.gsu.edu

Deep Extragalactic X-ray Surveys

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Deep surveys of the cosmic X-ray background are reviewed in the context of observational progress enabled by the *Chandra X-ray Observatory* and the *X-ray Multi-Mirror Mission-Newton*. The sources found by deep surveys are described along with their redshift and luminosity distributions, and the effectiveness of such surveys at selecting active galactic nuclei (AGN) is assessed. Some key results from deep surveys are highlighted including (1) measurements of AGN evolution and the growth of supermassive black holes, (2) constraints on the demography and physics of high-redshift AGN, (3) the X-ray AGN content of infrared and submillimeter galaxies, and (4) X-ray emission from distant starburst and normal galaxies. We also describe some outstanding problems and future prospects for deep extragalactic X-ray surveys.

Annual Reviews of Astronomy and Astrophysics, Volume 43 (2005), in press

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Preprint available at: http://www.astro.psu.edu/users/niel/papers/papers.html (with all figures) or http://arxiv.org/abs/astro-ph/0501058

The 2dF-SDSS LRG and QSO Survey: The $z < 2.1$ Quasar Luminosity Function from 5645 Quasars to $g = 21.85$

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We have used the 2-degree Field (2dF) instrument on the Anglo-Australian Telescope to obtain redshifts of a sample of $z < 3$, $18.0 < g < 21.85$ quasars selected from Sloan Digital Sky Survey (SDSS) imaging. These data are part of a larger joint programme between the SDSS and 2dF communities to obtain spectra of faint quasars and luminous red galaxies, namely the 2dF-SDSS LRG and QSO Survey (2SLAQ). We describe the quasar selection algorithm and present the resulting number counts and luminosity function of 5645 quasars in 105.7 deg^2. The bright end number counts and luminosity function agree well with determinations from the 2dF QSO Redshift Survey (2QZ) data to $g \sim 20.2$. However, at the faint end the 2SLAQ number counts and luminosity function are steeper (i.e. require more faint quasars) than the final 2QZ results from Croom et al. (2004), but are consistent with the preliminary 2QZ results from Boyle et al. (2000). Using the functional form adopted for the 2QZ analysis (a double-power law with pure luminosity evolution characterized by a 2nd order polynomial in redshift), we find a faint end slope of $\beta = -1.78 \pm 0.03$ if we allow all of the parameters to vary and $\beta = -1.45 \pm 0.03$ if we allow only the faint end slope and normalization to vary (holding all other parameters equal to the final 2QZ values). Over the magnitude range covered by the 2SLAQ survey, our maximum likelihood fit to the data yields 32 per cent more quasars than the final 2QZ parameterization, but is not inconsistent with other $g > 21$ deep surveys for quasars. The 2SLAQ data exhibit no well defined "break" in the number counts or luminosity function, but do clearly flatten with increasing magnitude. Finally, we find that the shape of the quasar luminosity function derived from 2SLAQ is in good agreement with that derived from type I quasars found in hard X-ray surveys.

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E-mail contact: gtr@astro.princeton.edu,
preprint available at http://xxx.lanl.gov/abs/astro-ph/0504300

The X-ray Spectral Properties and Variability of Luminous High-Redshift Active Galactic Nuclei

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We perform a detailed investigation of moderate-to-high quality X-ray spectra of ten of the most luminous active galactic nuclei (AGNs) known at $z > 4$ (up to $z \sim 6.28$). This study includes five new *XMM-Newton* observations and five archived X-ray observations (four by *XMM-Newton* and one by *Chandra*). We find that the X-ray power-law photon indices of our sample, composed of eight radio-quiet sources and two that are moderately radio loud, are not significantly different from those of lower redshift AGNs. The upper limits obtained on intrinsic neutral hydrogen column densities, $N_{\rm H} \lesssim 10^{22}$–$10^{23}$ cm^{-2}, indicate that these AGNs are not significantly absorbed. A joint fit performed on our eight radio-quiet sources, with a total of $\sim$7000 photons, constrains the mean photon index of $z > 4$ radio-quiet AGNs to Γ=$1.97^{+0.06}_{-0.04}$, with no detectable intrinsic dispersion from source to source. We also obtain a strong constraint on the mean intrinsic column density, $N_{\rm H} \lesssim 3\times10^{21}$ cm^{-2}, showing that optically selected radio-quiet AGNs at $z > 4$ are, on average, not more absorbed than their lower-redshift counterparts. All this suggests that the X-ray production mechanism and the central environment in radio-quiet AGNs have not significantly evolved over cosmic time. The mean equivalent width of a putative neutral narrow Fe Kα line is constrained to be $\lesssim 190$ eV, and similarly we place constraints on the mean Compton reflection component ($R \lesssim 1.2$). None of the AGNs varied on short ($\sim$1 hr) timescales, but on longer timescales (months-to-years) strong variability is observed in four of the sources. In particular, the X-ray flux of the z=5.41 radio-quiet AGN SDSS 0231−0728 dropped by a factor of $\sim$4 over a rest-frame period of 73 d. This is the most extreme X-ray variation observed in a luminous $z > 4$ radio-quiet AGN.

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Blueshifted [O III] Emission: Indications of a Dynamic NLR

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The [O III] λ5007 line is commonly used as an indicator of the systemic redshift of AGNs. Also, recent studies have used the width of this emission line as a proxy for the stellar velocity dispersion in the host galaxy. This paper calls both of these assumptions into question by analyzing a sample of approximately 400 AGN spectra from the first data release of the Sloan Digital Sky Survey. These spectra show that the low-ionization forbidden lines ([O II], [N II], [S II]) define a consistent redshift, but that the peak of the [O III] line is blueshifted in approximately half of the AGNs with respect to that redshift. For the sample studied here, the average shift is 40 km s^{-1}, with the largest shift being over 400 km s^{-1}. The magnitude of this shift is found to be correlated with a number of properties, including the width of the [O III] line and the Eddington ratio (L/L$_{Edd}$), derived from the luminosity and width of Hβ.

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VLBA Identification of the Milliarcsecond Active Nucleus in the Seyfert Galaxy NGC 4151

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The Seyfert galaxy NGC 4151 has been imaged at resolution better than 0.1 pc using a VLBI array consisting of the VLBA and three 100m-class telescopes. A flat-spectrum 3-mJy source with a monochromatic radio power of $\sim 10^{37}$ ergs s^{-1} has been detected, apparently at the location of the active galactic nucleus (AGN) and its central black hole. The radio source has a minimum brightness temperature of 2.1×10^8 K and a size upper limit of 0.035 pc, about 10 times the diameter of the broad-line region and 15,000 times the diameter of the black hole's event horizon. An additional flat-spectrum component located within a parsec of the apparent nucleus is likely to be a knot in the inner radio jet. The presence of some steep-spectrum radio emission within 0.1 pc of the galaxy nucleus limits the emission measure of a possible ionized torus to a maximum value of 10^8 cm^{-6}pc. If the hard X-ray source in NGC 4151 is associated with the radio AGN, its radio to X-ray ratio is less than 10^{-5}, putting NGC 4151 securely in the radio-quiet class of AGNs. The radio image reveals a 0.2-pc two-sided base to the well-known arcsecond radio jet. Apparent speeds of jet components relative to the radio AGN are $< 0.050c$ and $< 0.028c$ at respective nuclear distances of 0.16 pc and 6.8 pc. These are the lowest speed limits yet found for a Seyfert galaxy, and indicate non-relativistic jet motions, possibly due to thermal plasma, on a scale only an order of magnitude larger than the broad-line region.

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The OI Line Emission in the Quasar PG1116+215

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Observing the near-infrared spectrum of the quasar PG1116+215 at $z = 0.176$ and combining with the HST/FOS spectrum, we have obtained relative strengths of three permitted OI lines, namely, λ1304, λ8446, and λ11287 in a quasar for the first time. The photon flux ratios of the OI lines of the quasar are compared with those previously measured in a Seyfert 1 and six narrow-line Seyfert 1s. There are no significant differences in OI line flux ratios between the quasar and the other Seyferts, suggesting that the gas density in OI and FeII line emitting regions in the quasars is of the same order as those in the low-luminosity AGNs. It is also found that the line width of OIλ11287 is significantly narrower than that of Lyα, which is consistent with OI and FeII emission occurring in the partly ionized regions at the outermost portion of the broad-line region where velocities are small.

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preprint available at http://arxiv.org/abs/astro-ph/0505578

Meetings

Second announcment
ONE DAY MEETING ON “NEW RESULTS IN X-RAY ASTRONOMY”

Leicester University
Wednesday 6th July 2005

Continuing the series of annual one-day X-ray astronomy meetings in the UK, this year’s meeting will be held at the University of Leicester on Wednesay July 6th. The meeting will consist of contributed talks from X-Ray astronomers throughout the UK, on the subject of ’New Results in X-Ray Astronomy’.

This year’s meeting should be particularly interesting, with the recently-launched Swift satellite set to provide new and exciting insights into gamma-ray bursts, complementing the wide range of world-class science being undertaken in the UK with the Chandra, XMM-Newton, RXTE and INTEGRAL observatories.

All interested persons are invited to attend. In particular this workshop will provide an opportunity for newer members of the UK high energy community to present results, and to meet with members of other groups working in this area. There will be ample space for posters.

Those interested in attending should forward their contact details to Dr Tim Roberts (tro@star.le.ac.uk) by Friday June 10th. If you wish to participate (oral presentation or poster) please also forward the title and abstract by the closing date (stating oral or poster presentation). A detailed program will be published on the meeting web site shortly after the deadline has passed.

The meeting will be held in the Belvoir Park Lounge on the 2nd floor of the Charles Wilson building at the University of Leicester. Further details and contact information are provided at:

http://www.star.le.ac.uk/ukxra2005

We would be very grateful if you could circulate this announcement to other interested parties at your institute.

Regards,
Prof Bob Warwick, Dr Tim Roberts, Dr Simon Vaughan University of Leicester

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