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

REMINDER OF CHANGES TO THE NEWSLETTER

Please note that the web & email addresses for the Active Galaxies Newsletter has changed.

THE NEW EMAIL ADDRESS IS: agnews@manchester.ac.uk

THE WEB-PAGE ADDRESS IS: http://www.manchester.ac.uk/jodrellbank/~agnews

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.

Rob Beswick

Abstracts of recently accepted papers

Multi-wavelength study of the gravitational lens system RXS J1131-1231: III. Long slit spectroscopy: micro-lensing probes the QSO structure

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Aims: We discuss and characterize micro-lensing among the 3 brightest lensed images (A-B-C) of the gravitational lens system RXS J1131-1231 (a quadruply imaged AGN) by means of long slit optical and NIR spectroscopy. Qualitative constraints on the size of different emission regions are derived. We also perform a spectroscopic study of two field galaxies located within 1.6 arcmin radius from the lens.
Methods: We decompose the spectra into their individual emission components using a multi-component fitting approach. A

complementary decomposition of the spectra enables us to isolate the macro-lensed fraction of the spectra independently of any spectral modelling.
Results: 1. The data support micro-lensing de-amplification of images A & C. Not only is the continuum emission microlensed in those images but also a fraction of the Broad Line emitting Region (BLR).
2. Micro-lensing of a very broad component of Mg II emission line suggests that the corresponding emission occurs in a region more compact than the other components of the emission line.
3. We find evidence that a large fraction of the Fe II emission arises in the outer parts of the BLR. We also find a very compact emitting region in the ranges 3 080-3 540 Å and 4 630-4 800 Å that is likely associated with Fe II.
4. The [O III] narrow emission line regions are partly spatially resolved. This enables us to put a lower limit of $\sim 110h^{-1}$ pc on their intrinsic size.
5. Analysis of Mg II absorption found in the spectra indicates that the absorbing medium is intrinsic to the quasar, has a covering factor of 20%, and is constituted of small clouds homogeneously distributed in front of the continuum and BLRs.
6. Two neighbour galaxies are detected at redshifts $z = 0.10$ and $z = 0.289$. These galaxies are possible members of galaxy groups reported at those redshifts.

Accepted by Astronomy & Astrophysics

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preprint available at http://arxiv.org/abs/astro-ph/0703030

VIMOS-VLT spectroscopy of the giant Lyα nebulae associated with three z$\sim$2.5 radio galaxies

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The morphological and spectroscopic properties of the giant (>60 kpc) Lyα nebulae associated with three radio galaxies at z ~2.5 (MRC 1558-003, MRC 2025-218 and MRC 0140-257) have been investigated using integral field spectroscopic data obtained with VIMOS on VLT.

The morphologies are varied. The nebula of one source has a centrally peaked, rounded appearance. In the other two objects, it consists of two spatial components. The three nebulae are aligned with the radio axis within $\leq 30^o$. The total Lyα luminosities are in the range (0.3-3.4)$\times 10^{44}$ erg s^{-1}. The Lyα spectral profile shows strong variation through the nebulae, with FWHM values in the range ~400-1500 km s^{-1} and velocity shifts V_{offset} ~120-600 km s^{-1}.

We present an infall model that can explain successfully the morphology, size, surface brightness distribution and the velocity field of the Lyα nebula associated with MRC 1558-003. It can also explain why Lyα is redshifted relative to other emission lines and the FWHM values of the non resonant HeII line. This adds further support to our previous conclusion that the *quiescent* giant nebulae associated with this and other high redshift powerful radio galaxies are in infall. A problem for this model is the difficulty to reproduce the large Lyα FWHM values, which might be consequence of a different mechanism.

We have discovered a giant (~85 kpc) Lyα nebula associated with the radio galaxy MRC 0140-257 at z =2.64. It shows strikingly relaxed kinematics (FWHM<300 km s^{-1} and V_{offset} $\leq$120 km s^{-1}), unique among high z ($\geq$2) radio galaxies.

Accpeted by MNRAS

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Spectral Energy Distributions of Hard X-ray selected AGNs in the XMDS Survey

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We present the spectral energy distributions (SEDs) of a hard X-ray selected sample. The sample contains 136 sources with $F_{2-10keV}>10^{-14}$ erg cm^{-2} s^{-1} and 132 are AGNs. The sources are detected in a 1 deg^2 area of the XMM-Newton Medium Deep Survey where optical data from the VVDS, CFHTLS surveys, and infrared data from the SWIRE survey are available. Based on a SED fitting technique we derive photometric redshifts with $\sigma(1+z)$=0.11 and 6% of outliers and identify AGN signatures in 83% of the objects. This fraction is higher than derived when a spectroscopic classification is available. The remaining 17^{+9}_{-6}% of AGNs shows star-forming galaxy SEDs (SF class). The sources with AGN signatures are divided in two classes, AGN1 (33^{+6}_{-1}%) and AGN2 (50^{+6}_{-11}%). The AGN1 and AGN2 classes include sources whose SEDs are fitted by type 1 and type 2 AGN templates, respectively. On average, AGN1s show soft X-ray spectra, consistent with being unabsorbed, while AGN2s and SFs show hard X-ray spectra, consistent with being absorbed. The analysis of the average SEDs as a function of X-ray luminosity shows a reddening of the IR SEDs, consistent with a decreasing contribution from the host galaxy at higher luminosities. The AGNs in the SF classes are likely obscured in the mid-infrared, as suggested by their low $L_{3-20\mu m}/L^{corr}_{0.5-10keV}$ ratios. We confirm the previously found correlation for AGNs between the radio luminosity and the X-ray and the mid-infrared luminosities. The X-ray-radio correlation can be used to identify heavily absorbed AGNs. However, the estimated radio fluxes for the missing AGN population responsible for the bulk of the background at $E>$10 keV are too faint to be detected even in the deepest current radio surveys.

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Very High Energy γ -ray and Near Infrared observations of 1ES2344+514 during 2004-05

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We have observed the BL Lac object 1ES2344+514 (z = 0.04) in Very High Energy (VHE) gamma-ray and near-infrared wavelength bands with TACTIC and MIRO telescopes respectively. The observations were made from 18th October to 9th December 2004 and 27th October 2005 to 1st January 2006. Detailed data analysis of the TACTIC observations indicates absence of a statistically significant gamma-ray signal both in overall data and on nightly basis from the source direction. We estimate an upper limit of I($\geq$1.5 TeV)$\leq 3.84 \times 10^{-12}$ photons cm^{-2} s^{-1} at a 3σ confidence level on the integrated γ-ray flux. In addition, we have also compared TACTIC TeV light curves with those of the RXTE ASM (2-12keV) and found that there is no significant increase in the signal strength from the source in both these energy regions. During 2004 NIR observations, 1ES2344+514 shows low level (0.06 magnitude) day-to-day variation in both, J & H bands. However, during 2005 observation epoch, the source brightens up by about 0.4 mag from its October 2006 level (J magnitude $\sim$ 12.64) to J = 12.23 mag on

December 6, 2005. It then fades by about 0.2 magnitude during 6 to 10 December, 2005. The variation is seen in both, J & H, bands simultaneously. The light travel time arguments suggest that emission region size is of the order of 10^{17} cms.

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preprint available at http://www.prl.res.in/ baliyan/VHE-NIR-1es2344.pdf

The Physical Nature of Polar Broad Absorption Line Quasars

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It has been shown based on radio variability arguments that some BALQSOs (broad absorption line quasars) are viewed along the polar axis (orthogonal to accretion disk) in the recent article of Zhou et al. These arguments are based on the brightness temperature, T_b exceeding $10^{12\circ}$ K which leads to the well-known inverse Compton catastrophe unless the radio jet is relativistic and is viewed along its axis. In this letter, we expand the Zhou et al sample of polar BALQSOs to the entire SDSS DR5. In the process, we clarify a mistake in their calculation of brightness temperature. The expanded sample of high T_b BALQSOS, has an inordinately large fraction of LoBALQSOs (low ionization BALQSOs). We consider this an important clue to understanding the nature of the polar BALQSOs. This is expected in the polar BALQSO analytical/numerical models of Punsly in which LoBALQSOs occur when the line of sight is very close to the polar axis, where the outflow density is the highest.

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preprint available at http://xxx.lanl.gov/abs/0704.2407

FIRST-based survey of Compact Steep Spectrum sources, V. Milliarcsecond-scale morphology of CSS objects

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Multifrequency VLBA observations of the final group of ten objects in a sample of FIRST-based Compact Steep Spectrum (CSS) sources are presented. The sample was selected to investigate whether objects of this kind could be relics of radio-loud AGNs switched off at very early stages of their evolution or possibly to indicate intermittent activity. Initial observations were made using MERLIN at 5 GHz. The sources have now been observed with the VLBA at 1.7, 5 and 8.4 GHz in a snapshot mode with phase-referencing. The resulting maps are presented along with unpublished 8.4-GHz VLA images of five sources. Some of the sources discussed here show a complex radio morphology and therefore a complicated past that, in some cases, might indicate intermittent activity. One of the sources studied – 1045+352 – is known as a powerful radio and infrared-luminous broad absorption line (BAL) quasar. It is a young CSS object whose asymmetric two-sided morphology on a scale of several hundred parsecs, extending in two different directions, may suggest intermittent activity. The young age and compact structure of 1045+352 is consistent with the evolution scenario of BAL quasars. It has also been confirmed that the submillimetre flux of 1045+352 can be seriously contaminated by synchrotron emission.

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preprint available at http://arxiv.org/abs/0704.0351

The Distribution of AGN in Clusters of Galaxies

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We present a study of the distribution of AGN in clusters of galaxies with a uniformly-selected, spectroscopically-complete sample of 35 AGN in eight clusters of galaxies at $z = 0.06 \rightarrow 0.31$. We find that the 12 AGN with $L_X > 10^{42}\,\mathrm{erg\,s^{-1}}$ in cluster members more luminous than a rest-frame $M_R < -20$ mag are more centrally concentrated than typical cluster galaxies of

this luminosity, although these AGN have comparable velocity and substructure distributions to other cluster members. In contrast, a larger sample of 30 cluster AGN with $L_X > 10^{41}\,\mathrm{erg\,s^{-1}}$ do not show evidence for greater central concentration than inactive cluster members, nor evidence for a different kinematic or substructure distribution. As we do see clear differences in the spatial and kinematic distributions of the blue Butcher-Oemler and red cluster galaxy populations, any difference in the AGN and inactive galaxy population must be less distinct than that between these two pairs of populations. Comparison of the AGN fraction selected via X-ray emission in this study to similarly-selected AGN in the field indicates that the AGN fraction is not significantly lower in clusters, contrary to AGN identified via visible-wavelength emission lines, but similar to the approximately constant radio-selected AGN fraction in clusters and the field. We also find significant evidence for variation in the AGN fraction between clusters and explore the dependence of cluster AGN fraction on redshift, velocity dispersion, amount of cluster substructure, and fraction of Butcher-Oemler galaxies. While we see weak evidence for several trends, there are several correlations between these four parameters in our small sample of eight clusters that preclude identification of which one(s) most strongly influence the cluster AGN fraction.

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Line and continuum variability of two intermediate-redshift, high-luminosity quasars

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Context: It has been shown that the luminosity of active galactic nuclei and the size of their broad line region obey a simple relation of the type $R_{BLR} = aL^{\gamma}$, from faint Seyfert nuclei to bright quasars, allowing single-epoch determination of the central black hole mass $M_{BH} = bL^{\gamma}\Delta^2_{H_\beta}$ from their luminosity L and width of H_β emission line. Adopting this mass determination for cosmological studies requires the extrapolation to high redshift and luminosity of a relation whose calibration, relies so far on reverberation mapping measurements performed for $L \lesssim 10^{46}$erg s^{-1} and redshift $z \lesssim 0.4$.
Aims: We initiated a campaign for the spectrophotometric monitoring of a few luminous, intermediate redshift quasars whose apparent magnitude, $V < 15.7$, allows observations with a 1.8 m telescope, aimed at proving that emission lines vary and respond to continuum variations even for luminosities $\gtrsim 10^{47}$erg s^{-1}, and determining eventually their M_{BH} from reverberation mapping.
Methods: We have repeatedly performed simultaneous spectrophotometric observations of quasars and reference stars to determine relative variability of continuum and emission lines. We describe the observations and methods of analysis.
Results: For the quasars PG 1634+706 and PG 1247+268 we obtain light-curves respectively for CIII]($\lambda\lambda$1909Å), MgII($\lambda\lambda$2798Å) and for CIV($\lambda\lambda$1549Å), CIII]($\lambda\lambda$1909Å) emission lines with the relevant continua. During 3.2 years of observation, in the former case no continuum variability has been detected and the evidence for line variability is marginal, while in the latter case both continuum and line variability are detected with high significance and the line variations appear correlated with continuum variations.
Conclusions: The detection of the emission line variability in a quasar with $L \sim 10^{47}$erg s^{-1} encourages the prosecution of the monitoring campaign which should provide a black hole mass estimate in other 5-6 years, constraining the mass-luminosity relation in a poorly explored range of luminosity.

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preprint available at http://www.arxiv.org/abs/0704.1958/

An X-ray Survey in SA 57 with XMM-Newton

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Context: The maximum number density of Active Galactic Nuclei (AGNs), as deduced from X-ray studies, occurs at $z \lesssim 1$, with lower luminosity objects peaking at smaller redshifts. Optical studies lead to a different evolutionary behaviour, with a number

density peaking at $z \approx 2$ independently of the intrinsic luminosity, but this result is limited to active nuclei brighter than the host galaxy. A selection based on optical variability can detect low luminosity AGNs (LLAGNs), where the host galaxy light prevents the identification by non-stellar colours.
Aims: We want to collect X-ray data in a field where it exists an optically-selected sample of "variable galaxies", i.e. variable objects with diffuse appearance, to investigate the X-ray and optical properties of the population of AGNs, particularly of low luminosity ones, where the host galaxy is visible.
Methods: We observed a field of 0.2 deg^2 in the Selected Area 57, for 67 ks with XMM-Newton. We detected X-ray sources, and we correlated the list with a photographic survey of SA 57, complete to $B_J \sim 23$ and with available spectroscopic data.
Results: We obtained a catalogue of 140 X-ray sources to limiting fluxes 5×10^{-16}, 2×10^{-15} erg cm^{-2} s^{-1} in the 0.5-2 keV and 2-10 keV respectively, 98 of which are identified in the optical bands. The X-ray detection of part of the variability-selected candidates confirms their AGN nature. Diffuse variable objects populate the low luminosity side of the sample. Only 25/44 optically-selected QSOs are detected in X-rays. 15% of all QSOs in the field have $X/O < 0.1$.

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Acceleration and Substructure Constraints in a Quasar Outflow

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We present observations of probable line-of-sight acceleration of a broad absorption trough of C IV in the quasar SDSS J024221.87+004912.6. We also discuss how the velocity overlap of two other outflowing systems in the same object constrains the properties of the outflows. The Si IV doublet in each system has one unblended transition and one transition which overlaps with absorption from the other system. The residual flux in the overlapping trough is well fit by the product of the residual fluxes in the unblended troughs. For these optically thick systems to yield such a result, at least one of them must consist of individual subunits rather than being a single structure with velocity-dependent coverage of the source. If these subunits are identical, opaque, spherical clouds, we estimate the cloud radius to be $r \simeq 3.9 \times 10^{15}$ cm. If they are identical, opaque, linear filaments, we estimate their width to be $w \simeq 6.5 \times 10^{14}$ cm. These subunits are observed to cover the Mg II broad emission line region of the quasar, at which distance from the black hole the above filament width is equal to the predicted scale height of the outer atmosphere of a thin accretion disk. Insofar as that scale height is a natural size scale for structures originating in an accretion disk, these observations are evidence that the accretion disk can be a source of quasar absorption systems. Based on data from ESO program 075.B-0190(A).

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Recent Developments in Maser Theory

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This review covers selected developments in maser theory since the previous meeting, *Cosmic Masers: From Proto-Stars to Black Holes* (Migenes & Reid 2002). Topics included are time variability of fundamental constants, pumping of OH megamasers and indicators for differentiating disks from bi-directional outflows.

To appear in proceedings of IAU Symposium 242, "Astrophysical Masers and their Environments"

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preprint available at http://arxiv.org/abs/0704.2620

Meetings

Summer School on Active Galactic Nuclei at the highest angular resolution: theory and observations

Torun, Poland
August 27 - September 7, 2007

Webpage: http://www.vlti.org
Email: marconi@arcetri.inaf.it

Active galactic nuclei are a quickly evolving and exciting field of research at the forefront of modern astrophysics. The aim of this school is to present the most recent observational developments on AGNs and Supermassive Black Holes and to provide a description of these high angular resolution techniques with a special emphasis on observations with the Very Large Telescope Interferometer.

The school is composed of two series of lectures. The first series will provide and overview of AGN observations and theoretical models including special lectures on AGN observations with adaptive optics and interferometry, including existed and planned facilities like VLTI and ALMA. The second series of lectures will introduce the basic concepts of interferometry, its applications at optical and near infrared wavelengths and, with the aid of practical sessions, the students will learn to transform their ideas in VLTI observational proposals and will know how to work with VLTI interferometry data.

Confirmed Lecturers: Ric Davies, Moshe Elitzur, Andrew King, Roberto Maiolino, Klaus Meisenheimer, Hagai Netzer, Brad Peterson, Clive Tadhunter, Sylvain Veilleux

SOC: David Axon (USA), Annalisa Celotti (I), Bozena Czerny (PL), Ari Laor (IL), Alessandro Marconi (I, chair), Duccio Macchetto (ESA), Jorge Melnick (ESO), Andrzej Niedzielski (PL, co-chair), Guy Perrin (F, co-chair), Huub Rottgering (NL), Helene Sol (F), Linda Tacconi (D), Nektarios Vlahakis (G), Gerd Weigelt (D)

LOC: Andrzej Niedzielski (Chair), Monika Krzeminska (Secretary), Piotr Waz, Tomek Laczkowski, Pawel Zielinski, Stanislaw Krawczyk

Audience: This school is intended for PhD students and young post-docs working in the field of Active Galactic Nuclei and Supermassive Black Holes.

Funding: This school is funded by the European Union Marie Curie Program. We expect to fund full living and travel expenses of all PhD students and most young post-docs. The number of participants is 50. Participants will be selected ensuring a broad coverage of institutes and countries, and on motivation and domain of expertise. Non-european nationals are encouraged to apply.

REMINDER: *REGISTRATION DEADLINE* Weds May 2 - X-ray Grating Spectroscopy Workshop

, Cambridge, MA
July 11-13, 2007

Website: `http://cxc.harvard.edu/xgratings07`

We are pleased to announce X-ray Grating Spectroscopy, a science workshop sponsored by the Chandra X-ray Center. We are eager for scientists working with complementary spectroscopy at any wavelength to join the fun. The workshop will be held July 11-13, 2007 in Cambridge, Massachusetts at the Sheraton Commander Hotel.

The Workshop webpage `http://cxc.harvard.edu/xgratings07` provides details, including invited speakers, accommodation information, and a link for Registration/Abstract Submission.

For contributed talks and poster presentations the **DEADLINE is Wednesday May 02, 2007** for both registration and abstract submission. A final registration/submission deadline (for poster presentations only) is Wednesday May 30, 2007. Please note that this is during the AAS meeting.

1 Workshop Goals

- review progress afforded by X-ray grating spectroscopy of extragalactic and galactic sources
- compare/contrast physical conditions, estimates of location, geometry and kinematics of X-ray emitters/absorbers, encompassing collisionally- and photo-excited gas across different source types
- review and compare available atomic data and codes
- provide a forum for discussion of: -controversial or unexpected new results -potential new strategies for Chandra/XMM grating observations

1.1 Scope of the Meeting

1.1.1 INCLUDE

- New high-resolution X-ray spectroscopy results from the latest observations of extragalactic and galactic sources
- Deep IGM studies
- Related medium-resolution X-ray spectroscopy results from current satellites
- Theoretical interpretations and modeling issues
- Spectroscopic studies in conjunction with other wavebands
- The future of X-ray spectroscopy

1.1.2 EXCLUDE

- Results and discussions based primarily on X-ray imaging or timing results