Active Galaxies Newsletter	*An electronic publication dedicated to the observation and theory of active galaxies*
No. 208 — February 2015	Editor: Megan Argo (agnews@manchester.ac.uk)

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

From the Editor

Welcome to all the new subscribers, and thanks to everyone who contributed to this issue of the Active Galaxies Newsletter. This newsletter is intended to disseminate paper abstracts, meeting announcements, job adverts and other information which may be of interest to the active galaxies community. It is produced monthly and, whilst the deadline for contributions is the last day of the month, contributions may be submitted at any time.

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. Please note that the editor may reject submissions which do not use the template. As always, any suggestions or feedback regarding the newsletter are welcome.

Thanks for your continued subscription.

Megan Argo

Abstracts of recently accepted papers

The Host Galaxies and Narrow Line Regions of Four Double-Peaked [OIII] AGN

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Major gas-rich mergers of galaxies are expected to play an important role in triggering and fuelling luminous AGN. The mechanism of AGN fuelling during mergers however remains poorly understood. We present deep multi-band ($u/r/z$) imaging and long slit spectroscopy of four double-peaked [OIII] emitting AGN. This class of object is likely associated with either kpc-separated binary AGN or final stage major mergers, though AGN with complex narrow-line regions are known contaminants. Such objects are of interest since they represent the onset of AGN activity during the merger process. We present a study of four double-peaked [OIII] emitting AGN. Three have been confirmed as major mergers using near-infrared imaging, one is a confirmed X-ray binary AGN. All AGN are luminous, radio-quiet to radio-intermediate and have redshifts of $0.1 < z < 0.4$. Deep r-band images show that a majority (3/4) of the sources have disturbed host morphologies and tidal features, while the remaining source is morphologically undisturbed down to low surface brightness limits ($\sim$ 27 mag/arcsec ^{2} in r). All AGN hosted by merging galaxies have companions at distances $\leq$ 150 kpc. The narrow line regions (NLRs) have large sizes (10 kpc$< r <$100 kpc) and consist of compact clumps with considerable relative velocities between components ($\sim$ 200-650 km s^{-1}). We detect broad, predominantly blue, wings with velocities up to $\sim$1500 km s^{-1} in [OIII], indicative of powerful outflows. The outflows are compact (<5 kpc) and co-spatial with nuclear regions showing considerable redenning, consistent with enhanced star formation. One source shows an offset between gas and stellar kinematics, consistent with either a bipolar flow or a counter-rotating gas disk. In all other sources, the ionized gas generally follows the stars. We are not able to unambiguously identify the sources as binary AGN using our data, X-ray or radio data is required for an unambiguous identification. However, the data still yield interesting results for merger triggering of AGN.

Accepted for publication in The Astronomical Journal

E-mail contact: cv21@st-andrews.ac.uk
Preprint available at: http://arxiv.org/abs/1501.00325

The hidden quasar nucleus of a WISE-selected, hyperluminous, dust-obscured galaxy at $z \sim 2.3$

E. Piconcelli[1], C. Vignali[2,3], S. Bianchi[4], L. Zappacosta[1], J. Fritz[5], G. Lanzuisi[3], G. Miniutti[6], A. Bongiorno[1], C. Feruglio[7], F. Fiore[1], R. Maiolino[8]

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We present the first X-ray spectrum of a hot dust-obscured galaxy (DOG), namely W1835+4355 at $z \sim 2.3$. Hot DOGs represent a very rare population of hyperluminous ($\geq 10^{47}$ erg s^{-1}), dust-enshrouded objects at $z \geq 2$ recently discovered in the *WISE* All Sky Survey. The 40 ks *XMM-Newton* spectrum reveals a continuum as flat ($\Gamma \sim 0.8$) as typically seen in heavily obscured AGN. This, along with the presence of strong Fe Kα emission, clearly suggests a reflection-dominated spectrum due to Compton-thick absorption. In this scenario, the observed luminosity of $L_{2-10} \sim 2 \times 10^{44}$ erg s^{-1} is a fraction (<10%) of the intrinsic one, which is estimated to be $\geq 5 \times 10^{45}$ erg s^{-1} by using several proxies. The *Herschel* data allow us to constrain the SED up to the sub-mm band, providing a reliable estimate of the quasar contribution ($\sim$ 75%) to the IR luminosity as well as the amount of star formation ($\sim$ 2100 M$_\odot$ yr^{-1}). Our results thus provide additional pieces of evidence that associate Hot DOGs with an exceptionally dusty phase during which luminous quasars and massive galaxies co-evolve and a very efficient and powerful AGN-driven feedback mechanism is predicted by models.

Accepted by A&A Letters

E-mail contact: enrico.piconcelli@oa-roma.inaf.it
Preprint available at http://lanl.arxiv.org/abs/1412.3595

Cosmic X-ray Surveys of Distant Active Galaxies: The Demographics, Physics, and Ecology of Growing Supermassive Black Holes

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We review results from cosmic X-ray surveys of active galactic nuclei (AGNs) over the past $\approx$ 15 yr that have dramatically improved our understanding of growing supermassive black holes (SMBHs) in the distant universe. First, we discuss the utility of such surveys for AGN investigations and the capabilities of the missions making these surveys, emphasizing *Chandra*, *XMM-Newton*, and *NuSTAR*. Second, we briefly describe the main cosmic X-ray surveys, the essential roles of complementary multiwavelength data, and how AGNs are selected from these surveys. We then review key results from these surveys on the AGN population and its evolution ("demographics"), the physical processes operating in AGNs ("physics"), and the interactions between AGNs and their environments ("ecology"). We conclude by describing some significant unresolved questions and prospects for advancing the field.

The Astronomy and Astrophysics Review, in press

E-mail contact: niel@astro.psu.edu and d.m.alexander@durham.ac.uk
Preprint available at http://arxiv.org/abs/1501.01982
The final publication will be available at Springer via http://dx.doi.org/10.1007/s00159-014-0081-z

Coronal-Line Forest AGN: the best view of the inner edge of the AGN torus?

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We introduce Coronal-Line Forest Active Galactic Nuclei (CLiF AGN), AGN which have a rich spectrum of forbidden high-ionization lines (FHILs, e.g. [FeVII], [FeX] and [NeV]), as well as relatively strong narrow ($\sim$300 km s^{-1}) Hα emission when compared to the other Balmer transition lines. We find that the kinematics of the CLiF emitting region are similar to those of the forbidden low-ionization emission-line (FLIL) region. We compare emission line strengths of both FHILs and FLILs to CLOUDY photoionization results and find that the CLiF emitting region has higher densities ($10^{4.5} < n_H < 10^{7.5}$ cm^{-3}) when compared to the FLIL emitting region ($10^{3.0} < n_H < 10^{4.5}$ cm^{-3}). We use the photoionization results to calculate the CLiF regions radial distances ($0.04 < R_{CLiF} < 32.5$ pc) and find that they are comparable to the dust grain sublimation distances ($0.10 < R_{SUB} < 4.3$ pc). As a result we suggest that the inner torus wall is the most likely location of the CLiF region, and the unusual strength of the FHILs is due to a specific viewing angle giving a maximal view of the far wall of the torus without the continuum being revealed.

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E-mail contact: mrose@cfa.harvard.edu
Preprint available at http://arxiv.org/abs/1501.02705

Studies of the Jet in BL Lacertae. II. Superluminal Alfvén Waves

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We study the kinematics of ridge lines on the pc-scale jet of the active galactic nucleus BL Lac. We show that the ridge lines display transverse patterns that move superluminally downstream, and that the moving patterns are analogous to waves on a whip. Their apparent speeds $\beta_{\rm app}$ (units of c) range from 3.9 to 13.5, corresponding to $\beta^{\rm gal}_{\rm wave} = 0.981 - 0.998$ in the galaxy frame. We show that the magnetic field in the jet is well-ordered with a strong transverse component, and assume that it is helical and that the transverse patterns are Alfvén waves propagating downstream on the longitudinal component of the magnetic field. The wave-induced transverse speed of the jet is non-relativistic ($\beta^{\rm gal}_{\rm tr} \sim 0.09$). In 2010 the wave activity subsided and the jet then displayed a mild wiggle that had a complex oscillatory behaviour. The Alfvén waves appear to be excited by changes in the position angle of the recollimation shock, in analogy to exciting a wave on a whip by shaking the handle. A simple model of the system with plasma sound speed $\beta_{\rm s} = 0.3$ and apparent speed of a slow MHD wave $\beta_{\rm app,S} = 4$ yields Lorentz factor of the beam $\Gamma_{\rm beam} \sim 4.5$, pitch angle of the helix (in the **beam** frame) $\alpha \sim 67^\circ$, Alfvén speed $\beta_{\rm A} \sim 0.64$, and magnetosonic Mach number $M_{\rm ms} \sim 4.7$. This describes a plasma in which the magnetic field is dominant and in a rather tight helix, and Alfvén waves are responsible for the moving transverse patterns.

Accepted by Astroph. J.

E-mail contact: mhc@astro.caltech.edu
Preprint available at http://arxiv-web3.library.cornell.edu/abs/1409.3599v3

On the difference of torus geometry between hidden and non-hidden broad line active galactic nuclei

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We present results from the fitting of infrared (IR) spectral energy distributions of 21 active galactic nuclei (AGN) with clumpy torus models. We compiled high spatial resolution ($\sim$ 0.3–0.7 arcsec) mid-IR N-band spectroscopy, Q-band imaging and nuclear near- and mid-IR photometry from the literature. Combining these nuclear near- and mid-IR observations, far-IR photometry and clumpy torus models, enables us to put constraints on the torus properties and geometry. We divide the sample into three types according to the broad line region (BLR) properties; type-1s, type-2s with scattered or hidden broad line region (HBLR) previously observed, and type-2s without any published HBLR signature (NHBLR). Comparing the torus model parameters gives us the first quantitative torus geometrical view for each subgroup. We find that NHBLR AGN have smaller torus opening angles and larger covering factors than those of HBLR AGN. This suggests that the chance to observe scattered (polarized) flux from the BLR in NHBLR could be reduced by the dual effects of (a) less scattering medium due to the reduced scattering volume given the small torus opening angle and (b) the increased torus obscuration between the observer and the scattering region. These effects give a reasonable explanation for the lack of observed HBLR in some type-2 AGN.

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Preprint available at http://arxiv.org/abs/1501.06584

The systematic search for $z \geq 5$ active galactic nuclei in the *Chandra* Deep Field South

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We investigate early black hole (BH) growth through the methodical search for $z \geq 5$ AGN in the *Chandra* Deep Field South. We base our search on the *Chandra* 4-Ms data with flux limits of 9.1×10^{-18} (soft, $0.5-2$ keV) and 5.5×10^{-17} erg s^{-1} cm^{-2} (hard, $2-8$ keV). At $z \sim 5$ this corresponds to luminosities as low as $\sim 10^{42}$ ($\sim 10^{43}$) erg s^{-1} in the soft (hard) band and should allow us to detect Compton-thin AGN with $M_{\rm BH} > 10^7 M_\odot$ and Eddington ratios > 0.1. Our field (0.03 deg^2) contains over 600 $z \sim 5$ Lyman Break Galaxies. Based on lower redshift relations we would expect ~ 20 of them to host AGN. After combining the *Chandra* data with GOODS/ACS, CANDELS/WFC3 and *Spitzer*/IRAC data, the sample consists of 58 high-redshift candidates. We run a photometric redshift code, stack the GOODS/ACS data, apply colour criteria and the Lyman Break Technique and use the X-ray Hardness Ratio. We combine our tests and using additional data find that all sources are most likely at low redshift. We also find five X-ray sources without a counterpart in the optical or infrared which might be spurious detections. We conclude that our field does not contain any convincing $z \geq 5$ AGN. Explanations for this result include a low BH occupation fraction, a low AGN fraction, short, super-Eddington growth modes, BH growth through BH-BH mergers or in optically faint galaxies. By searching for $z \geq 5$ AGN we are setting the foundation for constraining early BH growth and seed formation scenarios.

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E-mail contact: anna.weigel@phys.ethz.ch
Preprint available at http://arxiv.org/abs/1501.06580

A New Black Hole Mass Estimate for Obscured Active Galactic Nuclei

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We propose a new method for estimating the mass of a supermassive black hole, applicable to obscured Active Galactic Nuclei (AGNs). This method estimates the black hole mass using the width of the narrow core of the neutral FeKα emission line in X-rays and the distance of its emitting region from the black hole based on the isotropic luminosity indicator via the luminosity scaling relation. We collect the line width data of the neutral FeKα line core for seven type-1 AGNs and seven type-2 AGNs obtained by the Chandra High Energy Transmission Grating Spectrometer, which affords the best spectral resolution currently available. Assuming the virial relation between the locations and the velocity widths of the neutral FeKα line core and the broad Hβ emission line, the luminosity scaling relation of the neutral FeKα line core emitting region is estimated. We find that the full width at half maximum of the neutral FeKα line core falls between that of the broad Balmer emission lines and the corresponding value at the dust reverberation radius for most of the type-1 AGNs and for all of the type-2 AGNs. This suggests that significant fraction of photons of the neutral FeKα line core originates between the outer BLR and the inner dust torus in most cases. The black hole mass $M_{\mathrm{BH,FeK}\alpha}$ estimated with this method is then compared with other black hole mass estimates, such as the broad emission-line reverberation mass $M_{\mathrm{BH,rev}}$ for the type-1 AGNs, the mass $M_{\mathrm{BH,H_2O}}$ based on the H_2O maser and the single-epoch mass estimate $M_{\mathrm{BH,pol}}$ based on the polarized broad Balmer lines for the type-2 AGNs. We find that $M_{\mathrm{BH,FeK}\alpha}$ is consistent with $M_{\mathrm{BH,rev}}$ for the most of the type-1 AGNs and with $M_{\mathrm{BH,pol}}$ for all of the type-2 AGNs. We also find that $M_{\mathrm{BH,FeK}\alpha}$ is correlated well with $M_{\mathrm{BH,H_2O}}$ for the type-2 AGNs. These results suggest that $M_{\mathrm{BH,FeK}\alpha}$ is a potential indicator of the black hole mass especially for obscured AGNs. In contrast, $M_{\mathrm{BH,FeK}\alpha}$ for which the same virial factor as for $M_{\mathrm{BH,rev}}$ and $M_{\mathrm{BH,pol}}$ is adopted is systematically larger than $M_{\mathrm{BH,H_2O}}$ by about a factor of ~ 5, and the possible origins are discussed.

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Preprint available at http://arxiv.org/abs/1501.07522

Time domain studies of Active Galactic Nuclei with the Square Kilometre Array

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Variability of radio-emitting active galactic nuclei can be used to probe both intrinsic variations arising from shocks, flares, and other changes in emission from regions surrounding the central supermassive black hole, as well as extrinsic variations due to scattering by structures in our own Galaxy. Such interstellar scattering also probes the structure of the emitting regions, with microarcsecond resolution. Current studies have necessarily been limited to either small numbers of objects monitored over long periods of time, or large numbers of objects but with poor time sampling. The dramatic increase in survey speed engendered by the Square Kilometre Array will enable precision synoptic monitoring studies of hundreds of thousands of sources with a cadence of days or less. Statistics of variability, in particular concurrent observations at multiple radio frequencies and in other bands of the electromagnetic spectrum, will probe accretion physics over a wide range of AGN classes, luminosities, and orientations, as well as enabling a detailed understanding of the structures responsible for radio wave scattering in the Galactic interstellar medium.

To be published in: "Advancing Astrophysics with the Square Kilometre Array", Proceedings of Science, PoS(AASKA14)

E-mail contact: H.Bignall@curtin.edu.au
Preprint available at http://arxiv.org/abs/1501.04627

Meetings

The Gravitational Wave Symphony of Structure Formation: Focus Meeting 14 at the 2015 IAU GA

Honolulu, Hawaii
12-14 August, 2014

Webpage: http://astronomy2015.org/focus_meeting_14/
Email: sspolaor@nrao.edu

The topics of this Focus Meeting are at the intersection of galaxy evolution and fundamental physics—how studies of galaxy mergers can inform the detection of gravitational waves and how the detection and study of gravitational waves can constrain models for galaxy mergers. See meeting website for full rationale:

http://astronomy2015.org/focus_meeting_14/

Topics include:
- The hunt for dual active galactic nuclei
- The dynamics of post-galaxy-merger supermassive black holes
- How pulsar timing arrays address black hole evolution
- Gravitational waves

Jobs

Postdoctoral Fellowship in AGN and/or Clusters of Galaxies
Dept of Physics & Astronomy, University of Manitoba
Deadline: 28th February 2015

Email contact: christopher.o'dea@umanitoba.ca
Further Information: http://umanitoba.ca/faculties/science/departments/physics/index.html

The Department of Physics and Astronomy at the University of Manitiba invites applications for a postdoctoral fellow working with Profs. Stefi Baum and Chris ODea on multi-wavelength observational studies of Active Galactic Nuclei and/or Clusters of Galaxies.

Candidates must hold a Ph.D. degree in astronomy, physics, or a related subject by the appointment start. The initial appointment will be for one year, renewable for a second and third year upon mutual agreement and availability of funding. The starting date is negotiable between the summer and early fall.

Applicants should submit a cover letter, CV, publication list, and a statement of research interests. Three letters of reference should also be submitted. All information should be emailed to christopher.o'dea@umanitoba.ca. Review of materials will begin Feb 1, 2015.

Winnipeg is the largest city in the Province of Manitoba. The city has a rich cultural environment, including symphony, opera, dance, theatre, and ethnic festivals. The region provides ample opportunities for outdoor recreation in all seasons. Learn more about Winnipeg at http://www.city.winnipeg.mb.ca.

The University of Manitoba is strongly committed to diversity within its community and especially welcomes applications from qualified women and men, visible minority group members, Aboriginal peoples, persons with disabilities, persons of all sexual orientations and genders and others who may contribute to the further diversification of ideas. All qualified candidates are encouraged to apply; however, Canadians and permanent residents will be given priority. Application materials, including letters of reference, will be handled in accordance with the protection of privacy provisions of The Freedom of Information and Protection of Privacy (Manitoba). Please note that your curriculum vitae may be provided to participating members of the search process.

Postdoctoral Position in Studies of Obscured Starbursts and AGNs
Chalmers University of Technology
Deadline: 6th February 2015

Email address for inquiries: saalto@chalmers.se
Further information: http://www.chalmers.se/en/about-chalmers/vacancies/?rmpage=job&rmjob=2690

Applications are invited for a postdoc position, with a duration of up to 2 years, to work with Professor Susanne Aalto (saalto@chalmers.se) on a project on obscured starbursts and AGNs through a range of observational but potentially also theoretical projects relating to the properties of deeply embedded galaxy nuclei and their associated in- and outflows.

You will be working in an extended network of collaboration consisting of senior researchers and postdocs - primarily across Europe (Sweden, UK, France, Spain, Italy, Germany, The Netherlands) but also involving partners in the US, Japan and Taiwan.

Applicants should have a PhD in an area of astrophysics that is relevant to the research programme outlined above. Experience in observational sub-millimetre astronomy, preferably in the areas of extragalactic star-formation and AGNs is an advantage.

Deadline for application: February 6 2015

Applications should be made online via this website:
http://www.chalmers.se/en/about-chalmers/vacancies/?rmpage=job&rmjob=2690

The above ad hints at a three year limit after PhD for the position but this does not apply for the postdoc position in question here.

Research Fellow/Senior Research Assistant in Radio and High Energy Astrophysics
University of Southampton
Deadline: 14th February 2015

Email address for enquiries: imh@soton.ac.uk
Further information: https://www.jobs.soton.ac.uk/Vacancy.aspx?ref=495114WF

A Research Fellow/Senior Reserch Assistant postion is available within the Southampton Astronomy Group to work mainly on analysis and scientific exploitation of the LeMMINGS Survey which is being undertaken with the new high resolution eMERLIN radio array. LeMMINGS is the second largest of the eMERLIN legacy surveys and will map all 280 galaxies above declination +20 in the Palomar Nearby Galaxies Survey with 50 mas resolution. Amongst the many aims are to carry out a census of accretion in the local universe and to precisely determine the radio/X-ray/mass 'fundamental plane'. The ideal applicant would be competent in radio analysis and also have some competence in other wavebands, eg X-ray and optical/IR, as most of the science aims require correlation of radio properties with those in other wavebands. The successful applicant may also be involved in eMERGE, the largest eMERLIN legacy survey centred on GOODS-N, whose aim is to study the cosmic evolution of the star formation rate and of AGN. The position is available for 2 years in the first instance with a possible extension to 3 years. The starting salary is between 28,695 and 30,434 depending on experience.

The Southampton Astronomy Group is one of the world's leading groups in the study of compact objects and variability across all wavebands and with interests in all scales from X-ray binary systems to cosmological.

The Astronomy group is part of the School of Physics & Astronomy, which is ranked as a world top-30 Physics department. We are part of the larger Faculty of Physical Sciences and Engineering which brings together fundamental physics research with one of the UK's largest and strongest computer science departments. We are also part of the new STAG Institute (Southampton Theory, Astronomy and Gravitation) which combines researchers across Physics, Astronomy and Mathematics.

The deadline for the receipt of application is 14 February 2015. The positions are available from 1 April 2015 but can be delayed for a suitable applicant. For further enquiries contact Prof Ian McHardy (imh@soton.ac.uk).

Application procedure:

You should submit your completed online application form at www.jobs.soton.ac.uk. If you need any assistance, please call Donna-Marie Stansbridge on +44 (0) 23 8059 4048. Please quote reference 495114WF on all correspondence