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

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

Neural-network selection of high-redshift radio quasars, and the luminosity function at $z \sim 4$

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We obtain a sample of 87 radio-loud QSOs in the redshift range $3.6 \leq z \leq 4.4$ by cross-correlating sources in the FIRST radio survey ($S_{1.4GHz} > 1$ mJy) with star-like objects having $r < 20.2$ in SDSS Data Release 7. Of these 87 QSOs, 80 are spectroscopically classified in previous work (mainly SDSS), and form the training set for a search for additional such sources. We apply our selection to 2,916 FIRST-DR7 pairs and find 15 likely candidates. Seven of these are confirmed as high-redshift quasars, bringing the total to 87. The candidates were selected using a neural-network, which yields 97% completeness (fraction of actual high-z QSOs selected as such) and an efficiency (fraction of candidates which are high-z QSOs) in the range of 47 to 60%. We use this sample to estimate the binned optical luminosity function of radio-loud QSOs at $z \sim 4$, and also the LF of the *total* QSO population and its comoving density. Our results suggest that the radio-loud fraction (RLF) at high z is similar to that at low-z and that other authors may be underestimating the fraction at high-z. Finally, we determine the slope of the optical luminosity function and obtain results consistent with previous studies of radio-loud QSOs and of the whole population of QSOs. The evolution of the luminosity function with redshift was for many years interpreted as a flattening of the bright end slope, but has recently been re-interpreted as strong evolution of the break luminosity for high-z QSOs, and our results, for the radio-loud population, are consistent with this.

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Preprint available at http://arxiv.org/abs/1502.01832

Obscuration in AGNs: near-infrared luminosity relations and dust colors

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We combine two approaches to isolate the AGN luminosity at near-infrared wavelengths and relate the near-IR pure AGN luminosity to other tracers of the AGN. Using integral-field spectroscopic data of an archival sample of 51 local AGNs, we estimate the fraction of non-stellar light by comparing the nuclear equivalent width of the stellar 2.3 μm CO absorption feature with the intrinsic value for each galaxy. We compare this fraction to that derived from a spectral decomposition of the integrated light in the central arc second and find them to be consistent with each other. Using our estimates of the near-IR AGN light, we find a strong correlation with presumably isotropic AGN tracers. We show that a significant offset exists between type 1 and type 2 sources in the sense that type 1 sources are 7 (10) times brighter in the near-IR at $\log L_{\rm AGN}^{\rm MIR} = 42.5$ ($\log L_{\rm AGN}^{\rm X} = 42.5$). These offsets only becomes clear when treating infrared type 1 sources as type 1 AGNs.

All AGNs have very red near-to-mid-IR dust colors. This, as well as the range of observed near-IR temperatures, can be explained with a simple model with only two free parameters: the obscuration to the hot dust and the ratio between the warm and hot dust areas. We find obscurations of $A_{\rm V}^{\rm hot} = 5 \ldots 15$ mag for infrared type 1 sources and $A_{\rm V}^{\rm hot} = 15 \ldots 35$ mag for type 2 sources. The ratio of hot dust to warm dust areas of about 1000 is nicely consistent with the ratio of radii of the respective regions as found by infrared interferometry.

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Preprint available at http://arxiv.org/abs/1504.01104

IC 3599 did it again: A second outburst of the X-ray transient Seyfert 1.9 galaxy

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We report on the *Swift* discovery of a second high-amplitude (factor 100) outburst of the Seyfert 1.9 galaxy IC 3599, and discuss implications for outburst scenarios. *Swift* detected this active galactic nucleus (AGN) again in February 2010 in X-rays at a level of $(1.5\pm0.11)\times10^{36}$ W (0.2-2.0 keV), which is nearly as luminous as the first outburst detected with *ROSAT* in 1990. Optical data from the Catalina sky survey show that the optical emission was already bright two years before the *Swift* X-ray high-state. Our new *Swift* observations performed between 2013 and 2015 show that IC 3599 is currently again in a very low X-ray flux state. This repeat optical and X-ray outburst, and the long optical duration, suggest that IC3599 is likely not a tidal disruption event (TDE). Instead, variants of AGN-related variability are explored. The data are consistent with an accretion disk instability around a black hole of mass on the order 10^6–10^7 $M_\odot$; a value estimated using several different methods.

ApJ Letters, in press

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Preprint available at http://xxx.lanl.gov/abs/1504.01389

Proving strong magnetic fields near to the central black hole in the quasar PG0043+039 via cyclotron lines

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The optical luminous quasar PG0043+039 has not been detected before in deep X-ray observations indicating the most extreme optical-to-X-ray slope index α_{ox} of all quasars. This study aims to detect PG0043+039 in a deep X-ray exposure. Furthermore, we wanted to check out whether this object shows specific spectral properties in other frequency bands. We took deep X-ray (XMM-Newton), far-ultraviolet (HST), and optical (HET, SALT telescopes) spectra of PG0043+039 simultaneously in July 2013. We just detected PG0043+039 in our deep X-ray exposure. The steep $\alpha_{ox} = -2.37 \pm 0.05$ gradient is consistent with an unusual steep gradient $F_\nu \sim \nu^\alpha$ with $\alpha = -2.67 \pm 0.02$ seen in the UV/far-UV continuum. The optical/UV continuum flux has a clear maximum near 2500 Å. The UV spectrum is very peculiar because it shows broad humps in addition to known emission lines. A modeling of these observed humps with cyclotron lines can explain their wavelength positions, their relative distances, and their relative intensities. We derive plasma temperatures of T $\sim$ 3 keV and magnetic field strengths of B $\sim 2 \times 10^8$ G for the line-emitting regions close to the black hole.

A&A, in press

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Preprint available at http://arxiv.org/abs/1504.04271

The complex gas kinematics in the nucleus of the Seyfert 2 galaxy NGC 1386: rotation, outflows and inflows

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We present optical integral field spectroscopy of the circum-nuclear gas of the Seyfert 2 galaxy NGC 1386. The data cover the central $7'' \times 9''$ (530 $\times$ 680 pc) at a spatial resolution of $0\farcs9$ (68 pc), and the spectral range 5700-7000 Å at a resolution of 66 km s^{-1}. The line emission is dominated by a bright central component, with two lobes extending $\approx 3''$ north and south of the nucleus. We identify three main kinematic components. The first has low velocity dispersion ($\bar{\sigma} \approx 90$ km s^{-1}), extends over the whole field-of-view, and has a velocity field consistent with gas rotating in the galaxy disk. We interpret the lobes as resulting from photoionization of disk gas in regions where the AGN radiation cones intercept the disk. The second has higher velocity dispersion ($\bar{\sigma} \approx 200$ km s^{-1}) and is observed in the inner 150 pc around the continuum peak. This component is double peaked, with redshifted and blueshifted components separated by ≈ 500 km s^{-1}. Together with previous HST imaging, these features suggest the presence of a bipolar outflow for which we estimate a mass outflow rate of $\dot{M} \gtrsim 0.1$ M$_\odot$ yr^{-1}. The third component is revealed by velocity residuals associated with enhanced velocity dispersion and suggests that outflow and/or rotation is occurring approximately in the equatorial plane of the torus. A second system of velocity residuals may indicate the presence of streaming motions along dusty spirals in the disk.

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The Energetics and Lifetimes of Local Radio Active Galactic Nuclei

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We present a model describing the evolution of Fanaroff-Riley type I and II radio AGN, and the transition between these classes. We quantify galaxy environments using a semi-analytic galaxy formation model, and apply our model to a volume-limited low redshift ($0.03 < z < 0.1$) sample of observed AGN to determine the distribution of jet powers and active lifetimes at the present epoch. Radio sources in massive galaxies are found to remain active for longer, spend less time in the quiescent phase, and inject more energy into their hosts than their less massive counterparts. The jet power is independent of the host stellar mass within uncertainties, consistent with maintenance-mode AGN feedback paradigm. The environments of these AGN are in or close to long-term heating-cooling balance. We also examine the properties of high- and low-excitation radio galaxy sub-populations. The HERGs are younger than LERGs by an order of magnitude, whilst their jet powers are greater by a factor of four. The Eddington-scaled accretion rates and jet production efficiencies of these populations are consistent with LERGs being powered by radiatively inefficient advection dominated accretion flows (ADAFs), while HERGs are fed by a radiatively efficient accretion mechanism.

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Preprint available at http://arxiv.org/abs/1504.05204

A New Catalogue of Type 1 AGN and its implication on the AGN unified model

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We have newly identified a substantial number of type 1 active galactic nuclei (AGN) featuring weak broad-line regions (BLRs) at $z < 0.2$ from detailed analysis of galaxy spectra in the Sloan Digital Sky Survey Data Release 7. These objects predominantly show a stellar continuum but also a broad Hα emission line, indicating the presence of a low-luminosity AGN oriented so that we are viewing the central engine directly without significant obscuration. These accreting black holes have previously eluded detection due to their weak nature. The new BLR AGNs we found increased the number of known type 1 AGNs by 49%. Some of these new BLR AGNs were detected at the *Chandra* X-ray Observatory, and their X-ray properties confirm that they are indeed type 1 AGN. Based on our new and more complete catalogue of type 1 AGNs, we derived the type 1 fraction of AGNs as a function of [O III] λ5007 emission luminosity and explored the possible dilution effect on the obscured AGN due to star-formation. The new type 1 AGN fraction shows much more complex behavior with respect to black hole mass and bolometric luminosity than suggested by the existing receding torus model. The type 1 AGN fraction is sensitive to both of these factors, and there seems to be a sweet spot (ridge) in the diagram of black hole mass and bolometric luminosity. Furthermore, we present a hint that the Eddington ratio plays a role in determining the opening angles.

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Monitoring the temperature and reverberation delay of the circumnuclear hot dust in NGC 4151

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A hot, dusty torus located around the outer edge of the broad-line region of AGNs is a fundamental ingredient in unified AGN models. While the existence of circumnuclear dust around AGNs at pc-scale radii is now widely accepted, questions about the origin, evolution and long-term stability of these dust tori remain unsettled. We used reverberation mapping of the hot circumnuclear dust in the Seyfert 1 galaxy NGC 4151, to monitor its temperature and reverberation lag as a function of the varying accretion disk brightness. We carried out multiband, multiepoch photometric observations of the nucleus of NGC 4151 in the z, Y, J, H, and K bands for 29 epochs from 2010 January to 2014 June, supported by new near-infrared and optical spectroscopic observations, and archived WISE data. We see no signatures of dust destruction due to sublimation in our data, since they show no increase in the hot dust reverberation delay directly correlated with substantial accretion disk flux increases in the observed period. Instead, we find that the hot dust in NGC 4151 appears to merely heat up, and the hot dust temperature closely tracks the accretion disk luminosity variations. We find indications of a decreased reverberation delay within the observed period from $\tau = 42.5 \pm 4.0$ days in 2010 to $\tau = 29.6 \pm 1.7$ days in 2013-2014. Such a varying reverberation radius on longer timescales would explain the intrinsic scatter observed in the radius-luminosity relation of dust around AGNs. Our observations rule out that a second, larger dust component within a 100-light-day radius from the source contributes significantly to the observed near-infrared flux in this galaxy.

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Preprint available at http://de.arxiv.org/abs/1504.07286

Spatially resolving the kinematics of the $\leq$100 μas quasar broad line region using spectroastrometry

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The broad line region (BLR) of luminous active galactic nuclei (AGN) is a prominent observational signature of the accretion flow around supermassive black holes, which can be used to measure their masses ($M_{\rm BH}$) over cosmic history. Due to the $\leq 100\mu$as angular size of the BLR, current direct constraints on BLR kinematics are limited to those provided by reverberation mapping studies, which are most efficiently carried out on low-luminosity L and low-redshift z AGN. We analyze the possibility to measure the BLR size and study its kinematic structure using *spectroastrometry*, whereby one measures the spatial position centroid of emission line photons as a function of velocity. We calculate the expected spectroastrometric signal of a rotation-dominated BLR for various assumptions about the ratio of random to rotational motions, and the radial distribution of the BLR gas. We show that for hyper-luminous quasars at $z < 2.5$, the size of the low-ionization BLR can already be constrained with existing telescopes and adaptive optics systems, thus providing a novel method to spatially resolve the kinematics of the accretion flow at $10^3 - 10^4$ gravitational radii, and measure $M_{\rm BH}$ at the high-L end of the AGN family. With a 30m-class telescope, BLR spectroastrometry should be routinely detectable for much fainter quasars out to $z \sim 6$, and for various emission lines. This will enable kinematic $M_{\rm BH}$ measurements as a function of luminosity and redshift, providing a compelling science case for next generation telescopes.

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Preprint available at http://de.arxiv.org/abs/1502.07767

The Lick AGN Monitoring Project 2011: Spectroscopic Campaign and Emission-line Light Curves

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In the Spring of 2011 we carried out a 2.5 month reverberation mapping campaign using the 3 m Shane telescope at Lick Observatory, monitoring 15 low-redshift Seyfert 1 galaxies. This paper describes the observations, reductions and measurements, and data products from the spectroscopic campaign. The reduced spectra were fitted with a multicomponent model in order to isolate the contributions of various continuum and emission-line components. We present light curves of broad emission lines and the AGN continuum, and measurements of the broad Hβ line widths in mean and root-mean square (rms) spectra. For the most highly variable AGNs we also measured broad Hβ line widths and velocity centroids from the nightly spectra. In four AGNs exhibiting the highest variability amplitudes, we detect anticorrelations between broad Hβ width and luminosity, demonstrating that the broad-line region "breathes" on short timescales of days to weeks in response to continuum variations. We also find that broad Hβ velocity centroids can undergo substantial changes in response to continuum variations; in NGC 4593 the broad Hβ velocity shifted by $\sim$ 250 km s^{-1} over a one-month duration in response to continuum variations. This reverberation-induced velocity shift effect is likely to contribute a significant source of confusion noise to binary black hole searches that use multi-epoch quasar spectroscopy to detect binary orbital motion. We also present results from simulations that examine biases that can occur in measurement of broad-line widths from rms spectra due to the contributions of continuum variations and photon-counting noise.

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Published article is available at http://iopscience.iop.org/0067-0049/217/2/26/

Meetings

The Extremes of Black Hole Accretion

Madrid, Spain
08th - 10th June 2015

Webpage: `http://xmm.esac.esa.int/external/xmm_science/workshops/2015_science/`
Email: `xmmws2015@sciops.esa.int`

Some of the most energetic processes seen in the Universe arise close to a super-massive black hole such as relativistic jets and winds. These are now known to play a key role in determining the growth of galaxies across cosmic time, but the mechanisms by which they are launched remain unclear. Recent progress on probing the properties of the accretion flow at the smallest radii include new spectral-timing techniques to identify the reverberation signal from the disc, as well as spectral studies of the ultrafast outflows, the broad iron line and soft X-ray excess. The stellar mass black holes provide a natural comparison sample, and again new data and new techniques are allowing us to focus in on the regions closest to the event horizon. The time is ripe for a conference to similarly focus on these extreme regions, to determine the structure of the accretion flow on the smallest scales and its relation to relativistic outflows and jets.

Invited Speakers: Matteo Bachetti, George Chartas, Thomas Dauser, Maria Diaz Trigo, Rob Fender, Adam Ingram, Julien Malzac, Sara Motta, Chris Reynolds, Francesco Tombesi, Phil Uttley, Simon Vaughan, Dominic Walton

SOC: Chris Done (chair), Massimo Cappi, Maria Diaz Trigo, Andy Fabian, Vladimir Karas, Giorgio Matt, Jon Miller, Giovanni Miniutti, Delphine Porquet, Daniel Proga, James Reeves, Christopher Reynolds, Maria Santos-Lleo, Norbert Schartel (co-chair), Stuart Sim, Yasuo Tanaka, Francesco Tombesi, Phil Uttley, Joern Wilms

LOC: J. Ness (chair), M. Arpizou, J. Ebrero, M. Ehle, C. Gabriel, A. Ibarra, R. Saxton, N. Schartel, XMM-Newton Science Operations Centre

Registration is possible until Monday May 21 at
`http://xmm.esac.esa.int/external/xmm_science/workshops/2015_science/#registration`

8th VLTI Summer School:

High angular resolution in astrophysics: optical interferometry from theory to observations

Cologne, Germany
6-13 September 2015

Webpage: `http://www.astro.uni-koeln.de/vltischool2015`
Email: `vlti2015-info@ph1.uni-koeln.de`

In the last decade, optical/infrared long-baseline interferometry has reached a new stage with the advent of multi-telescope arrays accessible to a broad community of astronomers. The Very Large Telescope Interferometer (VLTI), built in Chile and operated by the European Southern Observatory (ESO), is a good example of a fully open and operational interferometric facility. The next two years will see the second generation instruments, GRAVITY and MATISSE, commissioned on the VLTI. They will operate in interferometric mode with the four Unit (8-m) or Auxiliary (1.8-m) telescopes in the near- and mid-infrared spectral ranges (H-, K-, L-, M-, and N-bands). With the increasing number of telescopes that can be combined, interferometers are on the verge to reconstruct complex images at an unprecedented angular resolution. Interferometric techniques are useful for studies of a wide range of astrophysical objects such as young and evolved stars, and active galactic nuclei. The community has to prepare for the best possible exploitation of the second-generation instruments in a way that astronomers from a broad range of topics learn how to use interferometric data for their science.

With this objective in mind, we organize a summer school to train astronomers interested in optical interferometry. The prime objective of the school is to initiate astronomers to the use of VLTI by 1) showcasing some applications of VLTI in the field of young stellar objects, evolved stars and active galactic nuclei, 2) teaching the fundamentals of optical interferometry techniques and 3) organizing practical sessions with the software tools that will be used in this research field. The school is addressed to a wide public of persons involved into astronomical research, including undergraduate students, PhDs, postdocs or confirmed astronomers willing to exploit long baseline interferometry. The topics will include an introduction to the technique of long-baseline optical/infrared interferometry, and will cover the various steps of data reduction, basic modelling of interferometric data, as well as proposal writing and preparation of observing runs.

The school will be held in one of the largest and touristic cities of Germany, and a visit to the Effelsberg 100-m radio telescope is planned during this time.

Timeline

- February 2015: First announcement
- March 2015: Registration opened
- May 30th, 2015: Deadline for financial support request (via Fizeau program, see the recent *special call* on OLBIN)
- June 30th, 2015: Deadline for registration and payment (200 Euro)
- September 6th, 2015: Start of the the VLTI-school

LOC: Andres Cahuasqui, Fabio Eupen, Rebekka Grellmann, Elena Kokoulina, Lucas Labadie, Anas Maotahni, Balaji Muthusubramanian, Frank Schlder, Jan Tepper

SOC: Peter Ábrahám (Konkoly Obs), Yuri Balega (SAO), Jean-Philipe Berger (ESO), Gilles Duvert (IPAG), Paulo Garcia (Univ. Porto), Michiel Hogerheijde (Leiden Obs), Josef Hron (Univ. Vienna), Stefan Kraus (Univ. Exeter), Lucas Labadie (Chair, Univ. C Bruno Lopez (OCA), Alessandro Marconi (Univ. Florence), Andrzej Niedzielski (Torun), Guy Perrin (Paris Obs), Jörg-Uwe Pott (Chair, MPIA), Rainer Schödel (IAA), Jean Surdej (Univ. Liege), Gerd Weigelt (Chair, MPIfR)

Special Announcements

Fizeau exchange visitors program - special call for applications

2015-04-20

The Fizeau exchange visitors program in optical interferometry funds (travel and accommodation) visits of researchers to an institute of his/her choice (within the European Community) to perform collaborative work and training on one of the active topics of the European Interferometry Initiative. The visits will typically last for one month, and strengthen the network of astronomers engaged in technical, scientific and training work on optical/infrared interferometry. The program is open for all levels of astronomers (Ph.D. students to tenured staff). non-EU based missions will only be funded if considered essential by the Fizeau Committee. Applicants are strongly encouraged to seek also partial support from their home or host institutions.

IMPORTANT NOTE: This is a special call to support attendance of the 8th VLTI summer school:
http://www.astro.uni-koeln.de/vltischool2015
Therefore no research plan and invitation letter from the host institution are required.
The deadline for applications is May 30.

Further informations and application forms can be found at www.european-interferometry.eu

The program is funded by OPTICON/FP7.

Please distribute this message also to potentially interested colleagues outside of your community!

Looking forward to your applications,
Josef Hron & Laszlo Mosoni
(for the European Interferometry Initiative)

E-mail contact: fizeau@european-interferometry.eu