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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, thanks to everyone who contributed to this issue of the Active Galaxies Newsletter, and apologies for the slight delay in the publication of this month's issue.

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

Monitoring of GAmma-ray Bright AGN: The Multi-frequency Polarization of the Flaring Blazar 3C 279 †

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† Part of a special issue on the Korean VLBI Network (KVN)

We present results of long-term multi-wavelength polarization observations of the powerful blazar 3C 279 after its γ-ray flare on 2013 December 20. We followed up this flare with single-dish polarization observations using two 21-m telescopes of the Korean VLBI Network. Observations carried out weekly from 2013 December 25 to 2015 January 11, at 22 GHz, 43 GHz, 86 GHz simultaneously, as part of the Monitoring Of GAmma-ray Bright AGN (MOGABA) program. We measured 3C 279 total flux densities of 22–34 Jy at 22 GHz, 15–28 Jy (43 GHz), and 10–21 Jy (86 GHz), showing mild variability of $\leq 50\,\%$ over the period of our observations. The spectral index between 22 GHz and 86 GHz ranged from -0.13 to -0.36. Linear polarization angles were 27°–38°, 30°–42°, and 33°–50° at 22 GHz, 43 GHz, and 86 GHz, respectively. The degree of linear polarization was in the range of 6–12 %, and slightly decreased with time at all frequencies. We investigated Faraday rotation and depolarization of the polarized emission at 22–86 GHz, and found Faraday rotation measures (RM) of -300 to -1200 rad m^{-2} between 22 GHz and 43 GHz, and -800 to -5100 rad m^{-2} between 43 GHz and 86 GHz. The RM values follow a power law with a mean power law index a of 2.2, implying that the polarized emission at these frequencies travels through a Faraday screen in or near the jet. We conclude that the regions emitting polarized radio emission may be different from the region responsible for the 2013 December γ-ray flare and are maintained by the dominant magnetic field perpendicular to the direction of the radio jet at milliarcsecond scales.

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On the relation of optical obscuration and X-ray absorption in Seyfert galaxies

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The optical classification of a Seyfert galaxy and whether it is considered X-ray absorbed are often used interchangeably. But there are many borderline cases and also numerous examples where the optical and X-ray classifications appear to be in conflict. In this article we re-visit the relation between optical obscuration and X-ray absorption in AGNs. We make use of our "dust color" method (Burtscher et al. 2015a) to derive the optical obscuration $A_{\rm V}$ and consistently estimated X-ray absorbing columns using 0.3–150 keV spectral energy distributions. We also take into account the variable nature of the neutral gas column $N_{\rm H}$ and derive the Seyfert sub-classes of all our objects in a consistent way.

We show in a sample of 25 local, hard-X-ray detected Seyfert galaxies ($\log L_{\rm X}/({\rm erg/s}) \approx 41.5 - 43.5$) that there can actually be a good agreement between optical and X-ray classification. If Seyfert types 1.8 and 1.9 are considered unobscured, the threshold between X-ray unabsorbed and absorbed should be chosen at a column $N_{\rm H} = 10^{22.3}$ cm^{-2} to be consistent with the optical classification.

We find that $N_{\rm H}$ is related to $A_{\rm V}$ and that the $N_{\rm H}/A_{\rm V}$ ratio is approximately Galactic or higher in all sources, as indicated previously. But in several objects we also see that deviations from the Galactic ratio are only due to a variable X-ray column, showing that (1) deviations from the Galactic $N_{\rm H}/A_{\rm V}$ can simply be explained by dust-free neutral gas within the broad line region in some sources, that (2) the dust properties in AGNs can be similar to Galactic dust and that (3) the dust color method is a robust way to estimate the optical extinction towards the sublimation radius in all but the most obscured AGNs.

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Deep *Chandra* observations of Pictor A

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We report on deep *Chandra* observations of the nearby broad-line radio galaxy Pictor A, which we combine with new Australia Telescope Compact Array (ATCA) observations. The new X-ray data have a factor 4 more exposure than observations previously presented and span a 15-year time baseline, allowing a detailed study of the spatial, temporal and spectral properties of the AGN, jet, hotspot and lobes. We present evidence for further time variation of the jet, though the flare that we reported in previous work remains the most significantly detected time-varying feature. We also confirm previous tentative evidence for a faint counterjet. Based on the radio through X-ray spectrum of the jet and its detailed spatial structure, and on the properties of the counterjet, we argue that inverse-Compton models can be conclusively rejected, and propose that the X-ray emission from the jet is synchrotron emission from particles accelerated in the boundary layer of a relativistic jet. For the first time, we find evidence that the bright western hotspot is also time-varying in X-rays, and we connect this to the small-scale structure in the hotspot seen in high-resolution radio observations. The new data allow us to confirm that the spectrum of the lobes is in good agreement with the predictions of an inverse-Compton model and we show that the data favour models in which the filaments seen in the radio images are predominantly the result of spatial variation of magnetic fields in the presence of a relatively uniform electron distribution.

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A mid-infrared spectroscopic atlas of local active galactic nuclei on sub-arcsecond resolution using GTC/CanariCam

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We present an atlas of mid-infrared (mid-IR) $\sim 7.5 - 13\,\mu$m spectra of 45 local active galactic nuclei (AGN) obtained with CanariCam on the 10.4 m Gran Telescopio CANARIAS (GTC) as part of an ESO/GTC large program. The sample includes Seyferts and other low luminosity AGN (LLAGN) at a median distance of 35 Mpc and luminous AGN, namely PG quasars, (U)LIRGs, and radio galaxies (RG) at a median distance of 254 Mpc. To date, this is the largest mid-IR spectroscopic catalog of local AGN at sub-arcsecond resolution (median 0.3 arcsec). The goal of this work is to give an overview of the spectroscopic properties of the sample. The nuclear $12\,\mu$m luminosities of the AGN span more than four orders of magnitude, $\nu L_{12\mu\rm m} \sim 3\times10^{41} - 10^{46}\,{\rm erg\,s^{-1}}$. In a simple mid-IR spectral index vs. strength of the $9.7\,\mu$m silicate feature diagram most LLAGN, Seyfert nuclei, PG quasars, and RGs lie in the region occupied by clumpy torus model tracks. However, the mid-IR spectra of some might include contributions from other mechanisms. Most (U)LIRG nuclei in our sample have deeper silicate features and flatter spectral indices than predicted by these models suggesting deeply embedded dust heating sources and/or contribution from star formation. The $11.3\,\mu$m PAH feature is clearly detected in approximately half of the Seyfert nuclei, LLAGN, and (U)LIRGs. While the RG, PG quasars, and (U)LIRGs in our sample have similar nuclear $\nu L_{12\mu\rm m}$, we do not detect nuclear PAH emission in the RGs and PG quasars.

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Polarization microlensing in the quadruply imaged broad absorption line quasar H1413+117.

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We have obtained spectropolarimetric observations of the four images of the gravitationally lensed broad absorption line quasar H1413+117. The polarization of the microlensed image D is significantly different, both in the continuum and in the broad lines, from the polarization of image A, which is essentially unaffected by microlensing. The observations suggest that the continuum is scattered off two regions, spatially separated, and producing roughly perpendicular polarizations. These results are compatible with a model in which the microlensed polarized continuum comes from a compact region located in the equatorial plane close to the accretion disk and the non-microlensed continuum from an extended region located along the polar axis.

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The KMOS AGN Survey at High redshift (KASHz): the prevalence and drivers of ionised outflows in the host galaxies of X-ray AGN

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We present the first results from the KMOS AGN Survey at High redshift (KASHz), a VLT/KMOS integral-field spectroscopic (IFS) survey of $z > 0.6$ AGN. We present galaxy-integrated spectra of 89 X-ray AGN ($L_{2-10\rm keV} = 10^{42}$–$10^{45}\,\rm erg\,s^{-1}$), for which we observed [O III] ($z\approx1.1$–1.7) or Hα emission ($z\approx0.6$–1.1). The targets have X-ray luminosities representative of the parent AGN population and we explore the emission-line luminosities as a function of X-ray luminosity. For the [O III] targets, ≈50 per cent have ionised gas velocities indicative of gas that is dominated by outflows and/or highly turbulent material (i.e., overall line-widths >600 km s^{-1}). The most luminous half (i.e., $L_X > 6 \times 10^{43}\,\rm erg\,s^{-1}$) have a >2 times higher incidence of such velocities. On the basis of our results, we find no evidence that X-ray obscured AGN are more likely to host extreme kinematics than unobscured AGN. Our KASHz sample has a distribution of gas velocities that is consistent with a luminosity-matched sample of $z < 0.4$ AGN. This implies little evolution in the prevalence of ionised outflows, for a fixed AGN luminosity, despite an order-of-magnitude decrease in average star-formation rates over this redshift range. Furthermore, we compare our Hα targets to a redshift-matched sample of star-forming galaxies and despite a similar distribution of Hα luminosities and likely star-formation rates, we find extreme ionised gas velocities are up to ≈10× more prevalent in the AGN-host galaxies. Our results reveal a high prevalence of extreme ionised gas velocities in high-luminosity X-ray AGN and imply that the most powerful ionised outflows in high-redshift galaxies are driven by AGN activity.

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Interferometric Monitoring of Gamma-Ray Bright Active Galactic Nuclei II: Frequency Phase Transfer

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The Interferometric Monitoring of Gamma-ray Bright Active galactic nuclei (iMOGABA) program provides not only simultaneous multifrequency observations of bright gamma-ray detected active galactic nuclei (AGN), but also covers the highest Very Large Baseline Interferometry (VLBI) frequencies ever being systematically monitored, up to 129 GHz. However, observation and imaging of weak sources at the highest observed frequencies is very challenging. In the second paper in this series, we evaluate the viability of the frequency phase transfer technique to iMOGABA in order to obtain larger coherence time at the higher frequencies of this program (86 and 129 GHz) and image additional sources that were not detected using standard techniques. We find that this method is applicable to the iMOGABA program even under non-optimal weather conditions.

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Mid-infrared luminous quasars in the GOODS-*Herschel* fields: a large population of heavily-obscured, Compton-thick quasars at $z \approx 2$

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We present the infrared (IR) and X-ray properties of a sample of 33 mid-IR luminous quasars ($\nu L_{6\mu m} \geq 6 \times 10^{44}$ erg s^{-1}) at redshift $z \approx$ 1–3, identified through detailed spectral energy distribution analyses of distant star-forming galaxies, using the deepest IR data from *Spitzer* and *Herschel* in the GOODS-*Herschel* fields. The aim is to constrain the fraction of obscured, and Compton-thick (CT, $N_{\rm H} > 1.5 \times 10^{24}$ cm^{-2}) quasars at the peak era of nuclear and star-formation activities. Despite being very bright in the mid-IR band, ≈30% of these quasars are not detected in the extremely deep 2 Ms and 4 Ms *Chandra* X-ray data available in these fields. X-ray spectral analysis of the detected sources reveals that the majority (≈67%) are obscured by column densities $N_{\rm H} > 10^{22}$ cm^{-2}; this fraction reaches ≈80% when including the X-ray undetected sources (9 out of 33), which are likely to be the most heavily-obscured, CT quasars. We constrain the fraction of CT quasars in our sample to be ≈24-48%, and their space density to be $\Phi = (6.7 \pm 2.2) \times 10^{-6}$ Mpc^{-3}. From the investigation of the quasar host galaxies in terms of star-formation rates (SFRs) and morphological distortions, as a sign of galaxy mergers/interactions, we do not find any direct relation between SFRs and quasar luminosity or X-ray obscuration. On the other hand, there is tentative evidence that the most heavily-obscured quasars have, on average, more disturbed morphologies than the unobscured/moderately-obscured quasar hosts, which preferentially live in undisturbed systems. However, the fraction of quasars with disturbed morphology amongst the whole sample is ≈40%, suggesting that galaxy mergers are not the main fuelling mechanism of quasars at $z \approx 2$.

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A Spectroscopic Survey of X-ray Selected AGN in the Northern XMM-XXL Field

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This paper presents a survey of X-ray selected active galactic nuclei (AGN) with optical spectroscopic follow-up in a $\sim 18\,\mathrm{deg}^2$ area of the equatorial XMM-XXL north field. A sample of 8445 point-like X-ray sources detected by *XMM-Newton* above a limiting flux of $F_{0.5-10\,\mathrm{keV}} > 10^{-15}\,\mathrm{erg\,cm^{-2}\,s^{-1}}$ was matched to optical (*SDSS*) and infrared (*WISE*) counterparts. We followed up 3042 sources brighter than $r = 22.5$ mag with the SDSS *BOSS* spectrograph. The spectra yielded a reliable redshift measurement for 2578 AGN in the redshift range $z = 0.02 - 5.0$, with 0.5-2 keV luminosities ranging from $10^{39} - 10^{46}\,\mathrm{erg\,s^{-1}}$. This is currently the largest published spectroscopic sample of X-ray selected AGN in a contiguous area. The *BOSS* spectra of AGN candidates show a distribution of optical line widths which is clearly bimodal, allowing an efficient separation between broad- and narrow-emission line AGN. The former dominate our sample (70 per cent) due to the relatively bright X-ray flux limit and the optical *BOSS* magnitude limit. We classify the narrow emission line objects (22 per cent of the full sample) using standard BPT diagnostics: the majority have line ratios indicating the dominant source of ionization is the AGN. A small number (8 per cent of the full sample) exhibit the typical narrow line ratios of star-forming galaxies, or only have absorption lines in their spectra. We term the latter two classes "elusive" AGN, which would not be easy to identify correctly without their X-ray emission. We also compare X-ray (*XMM-Newton*), optical colour (*SDSS*), and IR (*WISE*) AGN selections in this field. X-ray observations reveal, by far, the largest number of AGN. The overlap between the selections, which is a strong function of the imaging depth in a given band, is also remarkably small. We show using spectral stacking that a large fraction of the X-ray AGN would not be selectable via optical or IR colours due to host galaxy contamination. A substantial fraction of AGN may therefore be missed by these longer-wavelength selection methods.

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We publicly release the catalogue of X-ray selected AGN on the following webpage:
http://www.mpe.mpg.de/XraySurveys/XMM-XXL/

Active Galactic Nuclei: What's in a name?

ESO, Garching bei München, Germany
June 27 - July 1, 2016

Webpage: `http://www.eso.org/sci/meetings/2016/AGN2016`
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Active Galactic Nuclei (AGN) are being discovered in ever-larger numbers over the whole electromagnetic spectrum. Different bands employ different methods to identify these sources but, most importantly, provide different windows on AGN physics. The infrared band is mostly sensitive to obscuring material and dust, the optical/UV band is related to emission from the accretion disk, while the X-ray band traces the emission of a (putative) corona. γ-ray and (high flux density) radio samples, on the other hand, preferentially select AGN emitting strong non-thermal radiation. This has led to a proliferation of classes, which outsiders (but insiders as well!) find mesmerizing. The main goal of the Workshop is to paint the AGN big picture, which comes out of these multi-wavelength surveys, and understand the truly intrinsic and fundamental properties of AGN and the physics behind them. This will be done by discussing primarily these topics:

- the different types of AGN selected in the various bands
- the similarities/differences they display
- the impact of selection effects on the interpretation of the results
- the physical mechanism(s) behind emission in a given band
- the effective range of black hole mass and Eddington ratio probed by a given selection method
- the possible limitations of current observations and/or facilities
- the "big picture" of AGN

All of the above will be achieved by having a **truly** multi-wavelength Workshop consisting of review and contributed talks distributed over six sessions: radio, infrared, optical, X-ray, γ-ray, and variability.

Review speakers: Vernesa Smolčić, Roberto Assef, Gordon Richards, Dave Alexander, Paolo Giommi, Barbara De Marco, and Phil Hopkins.

SOC: Paolo Padovani (chair), Evanthia Hatziminaoglou, Ryan Hickox, Lisa Kewley, Vincenzo Mainieri, Mara Salvato, John Silverman, Sylvain Veilleux