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.

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.

Janine van Eymeren

Abstracts of recently accepted papers

Merging and Clustering of the SWIFT BAT AGN Sample

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We discuss the merger rate, close galaxy environment, and clustering on scales up to a Mpc of the SWIFT BAT hard X-ray sample of nearby (z <0.05), moderate-luminosity active galactic nuclei (AGN). We find a higher incidence of galaxies with signs of disruption compared to a matched control sample (18% versus 1%) and of close pairs within 30 kpc (24% versus 1%). We also find a larger fraction with companions compared to normal galaxies and optical emission line selected AGN at scales up to 250 kpc. We hypothesize that these merging AGN may not be identified using optical emission line diagnostics because of optical extinction and dilution by star formation. In support of this hypothesis, in merging systems we find a higher hard X-ray to [O III] flux ratio, as well as emission line diagnostics characteristic of composite or star-forming galaxies, and a larger IRAS 60 μm to stellar mass ratio.

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preprint available at http://arxiv.org/abs/1006.0228

Modeling the Outflow in the Narrow-Line Region of Markarian 573: Biconical Illumination of a Gaseous Disk

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We present a study of the outflowing ionized gas in the resolved narrow-line region (NLR) of the Seyfert 2 galaxy Mrk 573, and its interaction with an inner dust/gas disk, based on *Hubble Space Telescope (HST)* WFPC2 and STIS observations. From the spectroscopic and imaging information, we determined the fundamental geometry of the outflow and inner disk, via two modeling programs used to recreate the morphology of these regions imaged with *HST*. We also determined that the bicone of ionizing radiation from the Active Galactic Nucleus (AGN) intersects with the inner disk, illuminating a section of the disk including inner segments of spiral arms, fully seen through structure mapping, which appear to be outflowing and expanding. In addition, we see high velocities at projected distances of $\geq 2''$ ($\sim$ 700 pc) from the nucleus, which could be due to rotation or to in situ acceleration of gas off the spiral arms. We find that the true half opening angle of the ionizing bicone (53 degrees) is much larger than the apparent half-opening angle (34 degrees) due to the above geometry, which may apply to a number of other Seyferts as well.

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E-mail contact: fischer@chara.gsu.edu,
preprint available at http://arxiv.org/abs/1006.1875

VLT and GTC observations of SDSS J0123+00: a type 2 quasar triggered in a galaxy encounter?

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We present long-slit spectroscopy, continuum and [OIII]λ5007 imaging data obtained with the Very Large Telescope and the Gran Telescopio Canarias of the type 2 quasar SDSS J0123+00 at z =0.399. The quasar lies in a complex, gas-rich environment. It appears to be physically connected by a tidal bridge to another galaxy at a projected distance of $\sim$100 kpc, which suggests this is an interacting system. Ionized gas is detected to a distance of at least $\sim$133 kpc from the nucleus. The nebula has a total extension of $\sim$180 kpc. This is one of the largest ionized nebulae ever detected associated with an active galaxy. Based on the environmental properties, we propose that the origin of the nebula is tidal debris from a galactic encounter, which could as well be the triggering mechanism of the nuclear activity. SDSS J0123+00 demonstrates that giant, luminous ionized nebulae can exist associated with type 2 quasars of low radio luminosities, contrary to expectations based on type 1 quasar studies.

Monthly Notices of the Royal Astronomical Society, MNRAS Letters

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Quasar bolometric corrections: theoretical considerations

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Bolometric corrections based on the optical-to-ultraviolet continuum spectrum of quasars are widely used to quantify their radiative output, although such estimates are affected by a myriad of uncertainties, such as the generally unknown line-of-sight angle to the central engine. In order to shed light on these issues, we investigate the state-of-the-art models of Hubeny et al. that describe the continuum spectrum of thin accretion discs and include relativistic effects. We explore the bolometric corrections as a function of mass accretion rates, black hole masses and viewing angles, restricted to the parameter space expected for type-1 quasars. We find that a nonlinear relationship $\log L_{\rm bol} = A + B\log(\lambda L_\lambda)$ with $B \leq 0.9$ is favoured by the models and becomes tighter as the wavelength decreases. We calculate from the model the bolometric corrections corresponding to the wavelengths $\lambda = 1450$ Å, 3000 Å and 5100 Å. In particular, for $\lambda = 3000$ Å we find $A = 9.24 \pm 0.77$ and $B = 0.81 \pm 0.02$. We demonstrate that the often-made assumption that quasars emit isotropically may lead to severe systematic errors in the determination of $L_{\rm bol}$, when using the method of integrating the "big blue bump" spectrum. For a typical viewing angle of $\approx 30°$ to the quasar central engine, we obtain that the value of $L_{\rm bol}$ resulting from the isotropy assumption has a systematic error of $\approx 30\%$ high compared to the value of $L_{\rm bol}$ which incorporates the anisotropic emission of the accretion disc. These results are of direct relevance to observational determinations of the bolometric luminosities of quasars, and may be used to improve such estimates.

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preprint available at arXiv:1006.3789

Reverberation Mapping Measurements of Black Hole Masses in Six Local Seyfert Galaxies

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We present the final results from a high sampling rate, multi-month, spectrophotometric reverberation mapping campaign undertaken to obtain either new or improved Hβ reverberation lag measurements for several relatively low-luminosity AGNs. We have reliably measured the time delay between variations in the continuum and Hβ emission line in six local Seyfert 1 galaxies. These measurements are used to calculate the mass of the supermassive black hole at the center of each of these AGNs. We place our results in context to the most current calibration of the broad-line region (BLR) $R_{\rm BLR}$–L relationship, where our results remove outliers and reduce the scatter at the low-luminosity end of this relationship. We also present velocity-resolved Hβ time delay measurements for our complete sample, though the clearest velocity-resolved kinematic signatures have already been published.

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Radiation pressure, absorption and AGN feedback in the Chandra Deep Fields

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The presence of absorbing gas around the central engine of Active Galactic Nuclei (AGN) is a common feature of these objects. Recent work has looked at the effect of the dust component of the gas, and how it enhances radiation pressure such that dusty gas can have a lower effective Eddington limit than ionised gas. In this work, we use multi-wavelength data and X-ray spectra from the 2 Ms exposures of the *Chandra* Deep Field North and *Chandra* Deep Field South surveys, to characterise the AGN in terms of their Eddington ratio (λ) and hydrogen column density (N_H). Their distributions are then compared with what is predicted when considering the coupling between dust and gas. Our final sample consists of 234 objects from both fields, the largest and deepest sample of AGN for which this comparison has been made up to date. We find that most of the AGN in our sample tend to be found at low Eddington ratios (typically $10^{-4} < \lambda < 10^{-1}$) and high N_H ($>10^{22}$cm^{-2}), with black hole masses in the range $\sim (10^8 - 10^9)M_\odot$. Their distribution is in agreement with that expected from the enhanced radiation pressure model, avoiding the area where we would predict the presence of outflows. We also investigate how the balance between AGN radiation pressure and gravitational potential influences the behaviour of clouds in the galactic bulge, and describe a scenario where an enhanced radiation pressure can lead to the fundamental plane of black hole/galaxy scaling relations.

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HerMES: Far infrared properties of known AGN in the HerMES

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Nuclear and starburst activity are known to often occur concomitantly. Herschel-SPIRE provides sampling of the far-infrared (FIR) spectral energy distributions (SEDs) of type 1 and type 2 AGN, allowing for the separation between the hot dust (torus) and cold dust (starburst) emission. We study large samples of spectroscopically confirmed type 1 and type 2 AGN lying within the Herschel Multi-tiered Extragalactic Survey (HerMES) fields observed during the science demonstration phase, aiming to understand their FIR colour distributions and constrain their starburst contributions. We find that one third of the spectroscopically confirmed AGN in the HerMES fields have 5 σ detections at 250 μm, in agreement with previous (sub)mm AGN studies. Their combined Spitzer-MIPS and Herschel-SPIRE colours (specifically S_{250}/S_{70} vs S_{70}/S_{24}) quite clearly separate them from the non-AGN, star forming galaxy population, as their 24 μm flux is dominated by the hot torus emission. However, their SPIRE colours alone do not differ from those of non-AGN galaxies. SED fitting shows that all those AGN need a starburst component to fully account for their FIR emission. For objects at z ¿ 2 we find a correlation between the infrared luminosity attributed to the starburst component, L_{SB}, and the AGN accretion luminosity, L_{acc}, with $L_{SB} \propto L_{acc}^{0.35}$. Type 2 AGN detected at 250 μm show on average higher L_{SB} than type 1 objects but their number is still too low to establish whether this trend indicates stronger star formation activity.

A&A, Herschel Special Issue

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preprint available at http://arxiv.org/abs/1005.2192

X-ray reverberation in 1H 0707–495 revisited

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The narrow-line Seyfert 1 galaxy 1H 0707–495 has previously been identified as showing time lags between flux variations in the soft- (0.3-1 keV) and medium-energy (1-4 keV) X-ray bands that oscillate between positive and negative values as a function of the frequency of the mode of variation. Here we measure and analyse the lags also between a harder X-ray band (4-7.5 keV) and the soft and medium bands, using existing *XMM-Newton* data, and demonstrate that the entire spectrum of lags, considering both the full energy range, 0.3-7.5 keV, and the full frequency range, $10^{-5} \lesssim \nu \lesssim 10^{-2}$ Hz, are inconsistent with previous claims of arising as reverberation associated with the inner accretion disk. Instead we demonstrate that a simple reverberation model, in which scattering or reflection is present in all X-ray bands, explains the full set of lags without requiring any *ad hoc* explanation for the time lag sign changes. The range of time delays required to explain the observed lags extends up to about 1800 s in the hard band. The results are consistent with reverberation caused by scattering of X-rays passing through an absorbing medium whose opacity decreases with increasing energy and that partially-covers the source. A high covering factor of absorbing and scattering circumnuclear material is inferred.

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Constraints on Black Hole Growth, Quasar Lifetimes, and Eddington Ratio Distributions from the SDSS Broad Line Quasar Black Hole Mass Function

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We present an estimate of the black hole mass function (BHMF) of broad line quasars (BLQSOs) that self-consistently corrects for incompleteness and the statistical uncertainty in the mass estimates, based on a sample of 9886 quasars at $1 < z < 4.5$ drawn from the Sloan Digital Sky Survey. We find evidence for 'cosmic downsizing' of black holes in BLQSOs, where the peak in their number density shifts to higher redshift with increasing black hole mass. The cosmic mass density for black holes seen as BLQSOs peaks at $z \sim 2$. We estimate the completeness of the SDSS as a function of black hole mass and Eddington ratio, and find that at $z > 1$ it is highly incomplete at $M_{BH} < 10^9 M_{Sun}$ and $L/L_{Edd} < 0.5$. We also estimate a lower limit on the lifetime of a single BLQSO phase and we place constraints on the maximum mass of a black hole in a BLQSO. Our estimated distribution of BLQSO Eddington ratios peaks at $L/L_{Edd} \sim 0.05$ and has a dispersion of ~ 0.4 dex, implying that most BLQSOs are not radiating at or near the Eddington limit; however the location of the peak is subject to considerable uncertainty. The steep increase in number density of BLQSOs toward lower Eddington ratios is expected if the BLQSO accretion rate monotonically decays with time. Furthermore, our estimated lifetime and Eddington ratio distributions imply that the majority of the most massive black holes spend a significant amount of time growing in an earlier obscured phase, a conclusion which is independent of the unknown obscured fraction. These results are consistent with models for self-regulated black hole growth, at least for massive systems at $z > 1$, where the BLQSO phase occurs at the end of a fueling event when black hole feedback unbinds the accreting gas, halting the accretion flow.

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Thesis Abstracts

Black Hole Masses in Active Galactic Nuclei

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We present results from two, high sampling-rate, multi-month, spectrophotometric reverberation mapping campaigns undertaken to obtain either new or improved Hβ reverberation lag measurements for several relatively low-luminosity active galactic nuclei (AGNs). We have reliably measured the time delay between variations in the continuum and Hβ emission line in seven local Seyfert 1 galaxies. These measurements are used to calculate the mass of the supermassive black hole at the center of each of these AGNs. We place our results in context to the most current calibration of the broad-line region (BLR) $R_{\rm BLR}$–L relationship, where our results remove many outliers and significantly reduce the scatter at the low-luminosity end of this relationship.

A detailed analysis of the data from our high sampling rate, multi-month reverberation mapping campaign in 2007 reveals that the Hβ emission region within the BLRs of several nearby AGNs exhibit a variety of kinematic behaviors. Through a velocity-resolved reverberation analysis of the broad Hβ emission-line flux variations in our sample, we reconstruct velocity-resolved kinematic signals for our entire sample and clearly see evidence for outflowing, infalling, and virialized BLR gas motions in NGC 3227, NGC 3516, and NGC 5548, respectively.

Finally, we explore the nature of systematic errors that can arise in measurements of black hole masses from single-epoch spectra of AGNs by utilizing the many epochs available for NGC 5548 and PG1229+204 from reverberation mapping databases. In particular, we examine systematics due to AGN variability, contamination due to constant spectral components (i.e., narrow lines and host galaxy flux), data quality (i.e., signal-to-noise ratio, S/N), and blending of spectral features. We investigate the effect that each of these systematics has on the precision and accuracy of single-epoch masses calculated from two commonly-used line-width measures by comparing these results to recent reverberation mapping studies. We then present an error budget which summarizes the minimum observable uncertainties as well as the amount of additional scatter and/or systematic offset that can be expected from the individual sources of error investigated.

Meetings

10th EVN Symposium 2010: VLBI and the new generation of radio arrays

Manchester, UK
September 20th-24th, 2010

Webpage: `http://www.jodrellbank.manchester.ac.uk/meetings/evn2010`
Email: `evnsymp2010@jb.man.ac.uk`

SCIENTIFIC RATIONALE:

Jodrell Bank Centre for Astrophysics and the University of Manchester, on behalf of the European VLBI Consortium, will host the 10th European VLBI Network Symposium from September 20th to 24th, 2010. The Symposium will be held at the University of Manchester, UK.

At this conference the latest scientific results and technical developments from VLBI and e-VLBI results will be reported. The timing of this meeting coincides with the development of, and first results from a number of new and upgraded radio facilities around the globe, such as e-MERLIN, LOFAR, EVLA, ALMA, and the SKA pathfinders ASKAP and MeerKAT. This meeting will incorporate some of the first results from these new instruments, in addition to the unique scientific and technical contribution of VLBI in this new era of radio astronomy.

SCIENCE SESSIONS:

This 4 day meeting will include science sessions based around 5 themes:

1. Life cycle of matter in stars and galaxies
   a) stars, star-formation, evolved stars
   b) nearby galaxies, SNR and RSN
2. AGN and cosmic star-formation
   a) AGN populations
   b) star-formation history; deep-fields
3. Extreme astrophysics
   a) extragalactic jets, magnetic fields
   b) XRB, GRB, transients
4. Astrometry, Geodesy, Space and Planetary Science
5. Techniques & developments in VLBI

This meeting will also include the EVN users meeting and a visit to Jodrell Bank Observatory.

REGISTRATION :

Formal registration for this conference is now open via an on-line registration form available from the conference website. (http://www.jb.man.ac.uk/meetings/evn2010/)

Participants who wish to present a contribution to the conference are requested to submit title, abstract, and type of presentation (poster or 15-20 min talk) along with the registration form. The deadline for the Abstracts and Registration is 15th July 2010. The presentations (oral/poster) accepted for the conference will be made known soon after the selection by the SOC.

PAYMENT - FINANCIAL SUPPORT :

There is a registration fee which includes admission to all scientific sessions, coffee breaks and lunches during the meeting and conference material. The registration fee is 270 GBP for those registering before 15th July, after which time the registration fee will rise to 350 GBP. Registration can be made, and information regarding credit card payments found on the conference website (http://www.jb.man.ac.uk/meetings/evn2010/registration_form.html). The associated conference dinner will cost an additional 30GBP, payable at registration.

A limited amount of funds will be made available for financial support to participants who make a request in their registration form. Priority will be given to students and post docs. Please indicate in your registration form your present status.

VENUE & ACCOMMODATION :

The conference will be held in the University of Manchester's conference venue, the Weston Building, which is situated in city centre of Manchester. Manchester itself is a vibrant city with ample attractions and amenities for all visitors. Accommodation for delegates has been reserved in the conference venue itself, however delegates will need to book their accommodation themselves. Further information regarding this conference as well as specific details regarding the venue and accommodation will be available shortly on the conference website and in subsequent announcements.

IMPORTANT DATES:

July 15 - End of early registration and abstract submission
Aug. 1 - Preliminary programme
Aug. 1 - Communication about financial support
Sept. 1 - Final announcement
Sept. 20-24 - 9th EVN Symposium and EVN Users meeting

On behalf of the SOC & LOC

Contact email address: evnsymp2010 [at] jb.man.ac.uk