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

The dusty heart of nearby active galaxies. I. High-spatial resolution mid-IR spectro-photometry of Seyfert galaxies

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In a series of papers, we aim at stepping towards characterizing physical properties of the AGN dust torus by combining IR high-spatial resolution observations with 3D clumpy torus models. In this first paper, we present mid-IR imaging and $8-13\,\mu$m low-resolution spectroscopy of nine type 1 and ten type 2 AGN. The observations were carried out with the VLT/VISIR mid-IR imager and spectrograph and can be considered the largest currently available mid-infrared spectro-photometric data set of AGN at spatial resolution <100 pc. These data resolve scales at which the emission from the dust torus dominates the overall flux, and emission from the host galaxy (e.g. star-formation) is resolved out in most cases. The silicate absorption features are moderately deep and emission features, if seen at all, are shallow. The strongest silicate emission feature in our sample shows some notable shift of the central wavelength from the expected $9.7\,\mu$m (based on ISM extinction curves) to $\sim 10.5\,\mu$m. We compare the observed mid-IR luminosities of our objects to AGN luminosity tracers (X-ray, optical and [OIII] luminosities) and find that the mid-IR radiation is emitted quite isotropically. In two cases, IC 5063 and MCG–3–34–64, we find evidence for extended dust emission in the narrow-line region. We confirm the correlation between observed silicate feature strength and Hydrogen column density, which was recently found in *Spitzer* data at lower spatial resolution. In a further step, our 3D clumpy torus model has been used to interpret the data. We show that the strength of the silicate feature and the mid-IR spectral index α can be used to get reasonable constraints on the radial dust distribution of the torus and the average number of clouds N_0 along an equatorial line-of-sight in clumpy torus models. The mid-IR spectral index α is almost exclusively determined by the radial dust distribution power-law index a, while the silicate feature depth mostly depends on $_0$ and the torus inclination. A comparison of model predictions to our type 1 and type 2 AGN reveals that average parameters of $a = -1.0 \pm 0.5$ and $N_0 = 5 - 8$ are typically seen in the presented sample, which means that the radial dust distribution is rather shallow. As a proof-of-concept of this method, we compared the model parameters derived from α and the silicate feature strength to more detailed studies of full IR SEDs and interferometry and found that the constraints on a and N_0 are consistent. Finally, we may have found evidence that the radial structure of the torus changes from low to high AGN luminosities towards steeper dust distributions, and we discuss implications for the IR size-luminosity relation.

Accepted by Astronomy & Astrophysics

E-mail contact: shoenig@physics.ucsb.edu,
preprint available at http://arxiv.org/abs/1003.0920

Episodic Star Formation Coupled to Reignition of Radio Activity in 3C 236

Grant R. Tremblay[1], Christopher P. O'Dea[1], Stefi A. Baum[1], Anton M. Koekemoer[2], William B. Sparks[2], Ger de Bruyn[3], and Arno P. Schoenmakers[3]

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We present *Hubble Space Telescope* ACS and STIS FUV/NUV/optical imaging of the radio galaxy 3C 236, whose relic ~ 4 Mpc radio jet lobes and inner 2 kpc CSS radio source are evidence of multiple epochs of AGN activity. Consistent with previous results, our data confirm the presence of four bright knots of FUV emission in an arc along the edge of the inner circumnuclear dust disk in the galaxy's nucleus, as well as FUV emission cospatial with the nucleus itself. We interpret these to be sites of recent or ongoing star formation. We present photometry of these knots, as well as an estimate for the internal extinction in the source using line ratios from archival ground-based spectroscopy. We estimate the ages of the knots by comparing our extinction-corrected photometry with stellar population synthesis models. We find the four knots cospatial with the dusty disk to be young, of order $\sim 10^7$ yr old. The FUV emission in the nucleus, to which we do not expect scattered light from the AGN to contribute significantly, is likely due to an episode of star formation triggered $\sim 10^9$ yr ago. We argue that the young $\sim 10^7$ yr old knots stem from an episode of star formation that was roughly coeval with the event resulting in reignition of radio activity, creating the CSS source. The $\sim 10^9$ yr old stars in the nucleus may be associated with the previous epoch of radio activity that generated the 4 Mpc relic source, before being cut off by exhaustion or interruption. The ages of the knots, considered in the context of both the disturbed morphology of the nuclear dust and the double-double morphology of the "old" and "young" radio sources, present evidence for an AGN/starburst connection that is possibly episodic in nature. We suggest that the AGN fuel supply was interrupted for $\sim 10^7$ yr due to a minor merger event and has now been restored. The resultant non-steady flow of gas in the disk is likely responsible for both the new episode of infall-induced star formation and also the multiple epochs of radio activity.

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E-mail contact: grant@astro.rit.edu,
preprint available at arXiv:1004.0388

The Lick AGN Monitoring Project: Reverberation Mapping of Optical Hydrogen and Helium Recombination Lines

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We have recently completed a 64-night spectroscopic monitoring campaign at the Lick Observatory 3-m Shane telescope with the aim of measuring the masses of the black holes in 12 nearby ($z < 0.05$) Seyfert 1 galaxies with expected masses in the range $\sim 10^6$–10^7 $M_\odot$ and also the well-studied nearby active galactic nucleus (AGN) NGC 5548. Nine of the objects in the sample (including NGC 5548) showed optical variability of sufficient strength during the monitoring campaign to allow for a time lag to be measured between the continuum fluctuations and the response to these fluctuations in the broad Hβ emission, which we have previously reported. We present here the light curves for the Hα, Hγ, HeII λ4686, and HeI λ5876 emission lines and the time lags for the emission-line responses relative to changes in the continuum flux. Combining each emission-line time lag with the measured width of the line in the variable part of the spectrum, we determine a virial mass of the central supermassive black hole from several independent emission lines. We find that the masses are generally consistent within the uncertainties. The time-lag response as a function of velocity across the Balmer line profiles is examined for six of the AGNs. We find similar responses across all three Balmer lines for Arp 151, which shows a strongly asymmetric profile, and for SBS 1116+583A and NGC 6814, which show a symmetric response about zero velocity. For the other three AGNs, the data quality is somewhat lower and the velocity-resolved time-lag response is less clear. Finally we compare several trends seen in the dataset against the predictions from photoionization calculations as presented by Korista & Goad. We confirm several of their predictions, including an increase in responsivity and a decrease in the mean time lag as the excitation and ionization level for the species increases. Specifically, we find the time lags of the optical recombination lines to have weighted mean ratios of $\tau(\mathrm{H}\alpha) : \tau(\mathrm{H}\beta) : \tau(\mathrm{H}\gamma) : \tau(\mathrm{HeI}) : \tau(\mathrm{HeII}) = 1.54 : 1.00 : 0.61 : 0.36 : 0.25$. Further confirmation of photoionization predictions for broad-line gas behavior will require additional monitoring programs for these AGNs while they are in different luminosity states.

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preprint available at http://arxiv.org/abs/1004.2922

Relativistic disc reflection in the extreme NLS1 IRAS13224-3809

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We present a spectral variability study of the XMM-Newton and Suzaku observations of one of the most extreme Narrow Line Seyfert 1 galaxies, IRAS13224-3809. The X-ray spectrum is characterized by two main peculiar features, i) a strong soft excess with a steep rise below about 1.3 keV and ii) a deep drop in flux above 8.2 keV. Although absorption–based interpretations may be able to explain these features by a suitable combination of ionization, covering factors, column densities and outflowing velocities, we focus here on a reflection–based interpretation which interprets both features, as well as the large soft excess, in terms of partially ionized reflection off the inner accretion disc. We show that the two peculiar spectral features mentioned above can be reproduced by two relativistic emission lines due to Fe K and Fe L. The lines are produced in the inner accretion disc and independently yield consistent disc parameters. We argue that the high L/K intensity ratio is broadly consistent with expectations from an ionized accretion disc reflection, indicating that they belong to a single ionized reflection component. The spectral shape, X–ray flux, and variability properties are very similar in the XMM and SUZAKU observations, performed about 5 years apart. The overall X–ray spectrum and variability can be described by a simple two–component model comprising a

steep power law continuum plus its ionised reflection off the inner accretion disc. In this model, a rapidly rotating Kerr black hole and a steep emissivity profile are required to describe the data. The simultaneous detection of broad relativistic Fe L and K lines in IRAS 13224-3809 follows that in another extreme NLS1 galaxy, 1H 0707–495. Although the data quality for IRAS13224-3809 does not allow us to rule out competing models as in 1H 0707–495, we show here that our reflection-based interpretation describes in a self–consistent manner the available data and points towards IRAS being a very close relative of 1H 0707–495 in terms of both spectral and variability properties. These results, together with those based on pure broad Fe K detections, are starting to unveil the processes taking place in the immediate vicinity of accreting radiatively efficient black holes.

MNRAS in press

preprint available at http://arxiv.org/abs/0911.1003

PARSEC-SCALE LOCALIZATION OF THE QUASAR SDSS J1536+0441A, A CANDIDATE BINARY BLACK HOLE SYSTEM

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The radio-quiet quasar (RQQ) SDSS J1536+0441A shows two broad-line emission systems, recently interpreted as a binary black hole (BBH) system with a subparsec separation; as a double-peaked emitter; or as both types of systems. The NRAO Very Long Baseline Array was used to search for 8.4 GHz emission from SDSS J1536+0441A, focusing on the optical localization region for the broad-line emission, of area 5400 mas^2 (0.15 kpc^2). One source was detected, with a diameter of less than 1.63 mas (8.5 pc) and a brightness temperature $T_b > 1.2\times10^7$ K. New NRAO Very Large Array photometry at 22.5 GHz, and earlier photometry at 8.5 GHz, gives a rising spectral slope of alpha = 0.35 +/- 0.08. The slope implies an optically thick synchrotron source, with a radius of about 0.04 pc, and thus $T_b \sim 5\times10^{10}$ K. The implied radio sphere at the rest frequency 31.2 GHz has a radius of 800 gravitational radii, just below the size of the broad-line region in this object. Observations at higher frequencies can probe whether or not the radio sphere is as compact as expected from the coronal framework for the radio emission of RQQs.

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preprint available at http://arxiv.org/abs/1004.0146

The origin of the relationship between black hole mass and host galaxy bulge luminosity

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There is a strong decrease in scatter in the $M_\bullet - L_{bulge}$ relationship with increasing luminosity and very little scatter for the most luminous galaxies. It is shown that this is a natural consequence of the substantial initial dispersion in the ratio of black hole mass to total stellar mass and of subsequent galaxy growth through hierarchical mergers. "Fine-tuning" through feedback between black hole growth and bulge growth is neither necessary nor desirable.

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preprint available at http://adsabs.harvard.edu/abs/2010arXiv1004.1180G

X–ray and multiwavelength view of NGC 4278. A LINER–Seyfert connection?

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The emission mechanism responsible for the bulk of energy from radio to X–rays in low ionization emission line regions (LINERs) and Low Luminosity Active Galactic Nuclei (LLAGN) has been long debated. Based on UV to X–ray and radio to UV flux ratios, some argue that LINERs/LLAGN are a scaled-down version of their more luminous predecessors Seyfert galaxies. Others, based on the lack of X–ray short (hours) time–scale variability, the non detection of an iron line at 6.4 keV, and the faint UV emission compared to typical AGNs, suggest the truncation of the classical thin accretion disk in the inner regions of the AGN where a radiatively inefficient accretion flow (RIAF) structure forms. We investigate the LINER–Seyfert connection by studying the unabsorbed LINER galaxy NGC 4278 that accretes at a low rate ($L_{bol/Edd} \sim 7\times10^{-6}$) but exhibits a broad H$\alpha$ line, and a point-like nucleus in radio, optical, UV and X-rays. We analyzed one *XMM-Newton* and seven *Chandra* X-ray observations of NGC 4278 spread over a three year period, allowing the study of the X–ray variability at different time-scales (hours, months, years). We also examined the radio to X-ray spectral energy distribution to constrain the accretion mode in the nucleus of NGC 4278. Long time-scale (months) variability is observed where the flux increased by a factor of ∼3 on a time-scale of a few months and by a factor of 5 between the faintest and the brightest observation separated by ∼3 years. During the *XMM-Newton* observation, where the highest flux level is detected, we found a 10% flux increase on a short time-scale of a few hours, while the light curves for the different *Chandra* observations do not show short time-scale (minutes to hours) variability. A combination of an absorbed power law ($N_H \approx 10^{20}$ cm^{-2}, $\Gamma = 2.2^{+0.1}_{-0.2}$) plus a thermal component (kT≈ 0.6 keV) were able to fit the *Chandra* spectra. The *XMM-Newton* spectra, where the highest X–ray flux is detected, are well fitted with an absorbed power–law with no need for a thermal component as the emission from the power–law component is dominant. The power–law photon index is ∼ 2.1 and the hydrogen column density is of the order of 10^{20} cm^{-2}. Neither a narrow nor a broad Fe Kα emission line at 6.4 keV are detected with a 22 eV and 118 eV upper limits derived on their equivalent widths. We derive optical fluxes from archival *HST* ACS observations and detected optical variability on time–scales of years. For the first time for this source, thanks to the optical/UV monitor on board *XMM-Newton*, we obtained simultaneous UV and X-ray flux measurements. We constructed SEDs based on simultaneous or quasi simultaneous observations and compared them to LINER, radio–loud, and radio–quiet quasar SEDs. We find that at a low X–ray flux the NGC 4278 SED resembles that of typical LINER sources where the radio to X–ray emission can be considered as originating from a jet and/or RIAF, whereas at a high X–ray flux, NGC 4278 SED is more like a low luminosity Seyfert SED. Consequently, NGC 4278 could exhibit both LINER and Seyfert nuclear activity depending on the strength of its X–ray emission.

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preprint available at http://arxiv.org/abs/1004.5134

Mid-Infrared Properties of the *Swift* Burst Alert Telescope Active Galactic Nuclei Sample of the Local Universe. I. Emission-Line Diagnostics

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We compare mid-infrared emission-line properties, from high-resolution *Spitzer* spectra of a hard X-ray (14 – 195 keV) selected sample of nearby ($z < 0.05$) AGN detected by the Burst Alert Telescope (BAT) aboard *Swift*. The luminosity distribution for the mid-infrared emission-lines, [O IV] 25.89 μm, [Ne II] 12.81 μm, [Ne III] 15.56 μm and [Ne V] 14.32/24.32 μm, and hard X-ray continuum show no differences between Seyfert 1 and Seyfert 2 populations, however six newly discovered BAT AGNs are under-luminous in [O IV], most likely the result of dust extinction in the host galaxy. The overall tightness of the mid-infrared correlations and BAT fluxes and luminosities suggests that the emission lines primarily arise in gas ionized by the AGN. We also compare the mid-infrared emission-lines in the BAT AGNs with those from published studies of ULIRGs, PG QSOs, star-forming galaxies and LINERs. We find that the BAT AGN sample fall into a distinctive region when comparing the [Ne III]/[Ne II] and the [O IV]/[Ne III] ratios. These line ratios are lower in sources that have been previously classified in the mid-infrared/optical as AGN than those found for the BAT AGN, suggesting that, in our X-ray selected sample, the AGN represents the main contribution to the observed line emission. These ratios represent a new emission line diagnostic for distinguishing between AGN and star forming galaxies.

Accepted for publication in The Astrophysical Journal. The paper contains 9 figures and 4 tables.

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preprint available at http://arxiv.org/abs/1004.5321

Meetings

Multiwavelength Variability of Blazars

Guangzhou, China
September 22nd-24th, 2010

Webpage: `http://cfa.gzhu.edu.cn/mvb/`
Email: `fjh@gzhu.edu.cn`

Blazars are unusually energetic objects in the extragalactic universe. They are characterized with highly variable emissions in radio through gamma-ray bands, high and variable polarization, superluminal motion, strong emission lines or no emission lines. Blazars are even detected in energetic TeV bands, they are fueled by a supermassive black hole at the center, from which a relativistic jet, pointing closely to the line of sight, comes out. The variable time scales range from minutes to years. The variability should shed some lights on the nature of the variability and even the emission mechanism.

In the past years, many facilities have been available for Blazar observations, theoretical researches have also developed, which bring us a lot of developments in our understanding of these interesting objects. Therefore, we organize this meeting in Sept, 22-24, 2010 at Guangzhou University, China.

Guangzhou University is a ten-year old university merged from 5 universities/colleges in 2000. It locates in Guangzhou University City, which was constructed in 2004.

Guangzhou, known as the "Flower City", is the capital city of Guangdong Province. It is a city full of history, culture and life. Guangzhou has a history of 2200 years and is the window of reform and opening up in China. The 16th Asian Games will be held in Nov. 12-27, 2010 in Guangzhou. From Guangzhou, it takes one hour to Shenzhen, two hours to Hong Kong by inter-city train, and two hours to Macao by bus.

The meeting will be hosted by Guangzhou University, Guangdong Provincial Association for Science and Technology, Guangdong Astronomical Society, Guangzhou Association for Science and Technology. Guangzhou Municipality Education Bureau.

Scientific Organizing Committee (SOC):
Margo. Aller(USA)
Jiansheng Chen (China)
Junhui Fan (China, Chair)
Gabrieke Ghisellini(Italy)
Alok Gupta(India)
Omar Kurtanidze(Georgie)
TongXu Hua(China)
Alan. Marscher (USA)
Gustavo E. Romero (Argentina, co-chair)
Zhiqiang Shen (China, co-chair)
Aimo Sillanpaa (Finland)
Leo Takalo(Finland)
C. Meg. Urry(USA)
Massimo Villata(Italy)
Stefan Wagner (Germany)
Gang Zhao(China)
Youyuan Zhou(China)

Important Dates
Meeting: 22nd September 2010
Final program: 31st August 2010
Abstract submission deadline: 10th August 2010
Early registration deadline: 31st May 2010
Financial support application deadline: 31st May 2010
Registration opening: 8th March 2010

Additional information and details on Registration can be found at the Meeting web page(http://cfa.gzhu.edu.cn/mvb/)

Looking forward to seeing you in Guangzhou, China! Junhui Fan, on behalf of the organizers.

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 firs results from these new instruments, in addition to the unique scientific and technical contribution of VLBI in this new era of radio astronomy.

PLANNED SCIENCE SESSIONS will include: Life cycle of matter in stars and galaxies; AGN and cosmic star-formation; Extreme Astrophysics; Astrometry, Geodesy, space and planetary science; and Techniques & developments.

VENUE: 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. Block bookings of rooms for the duration of the meeting at the conference venue itself. Further information regarding this conference as well as specific details regarding the venue and accommodation will available shortly on the conference website and in subsequent announcements. This meeting will also incorporate the EVN Users meeting and a trip to Jodrell Bank Observatory.