Active Galaxies Newsletter	*An electronic publication dedicated to the observation and theory of active galaxies*
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Abstracts - Thesis Abstracts - Jobs - Meetings

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.

Rob Beswick

Abstracts of recently accepted papers

Long-term IR Photometry of Seyferts

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Long-term (up to 10000d) monitoring has been undertaken for 41 Seyferts in the near infrared (1.25 – 3.45μm). All but two showed variability, with amplitudes at K in the range < 0.1 to $>$1.1 mag. The timescale for detectable change is from about one week to a few years.

Where contemporary observations of variability in x-rays, UV or visible light exist, it is found that the near-infrared varies in a similar way, though in some cases the shorter-wavelength IR bands are diluted by underlying galaxy radiation.

A simple cross-correlation study indicates that there is evidence for delays of up to several hundred days between the variations seen at the shortest wavelengths (U or J) and the longest (L) in many galaxies. In particular, the data for Fairall 9 now extend to twice the interval covered in earlier publications and the delay between its UV and IR outputs is seen to persist.

An analysis of the fluxes shows that, for any given galaxy, the colours of the variable component of its nucleus are usually independent of the level of activity. The state of activity of the galaxy can be parameterized.

Taken over the whole sample, the colours of the variable components fall within moderately narrow ranges. In particular, the $H - K$ colour is appropriate to a black body of temperature 1600K. The $H - K$ excess for a heavily reddened nucleus can be determined and used to find E_{B-V}, which can be compared to the values found from the visible region broad line ratios.

Using flux-flux diagrams, the flux within the aperture from the underlying galaxies can often be determined without the need for model surface brightness profiles. In many galaxies it is apparent that there must be an additional constant contribution from warm dust.

Accepted by MNRAS

E-mail contact: isg@saao.ac.za,
preprint available at anonymous ftp: ftp.saao.ac.za pub/isg/seyf.pdf

Evolution of BL Lacertae host galaxies

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We present and discuss deep, high-resolution I-band images of 24 BL Lac objects between z = 0.3 and 1.3 taken with the Nordic Optical Telescope (NOT) and the ESO-NTT and VLT telescopes. In addition, new redshifts for the BL Lac objects PKS 0406+121, PKS 0426-380 and PKS 1519-273 are reported.
In 17/24 (71%) of the BL Lac objects, we detected an underlying nebulosity, in 11/17 for the first time. We assigned the underlying nebulosity to the BL Lac host galaxy in 11 cases spanning the redshift range z = 0.3-1. The remaining 6 BL Lac objects have either intervening galaxies (S4 0218+35, PKS 0426-380), no redshift (MH 2133-449) or are probably misidentified (Q 0230+3429, B2 0937+26, MS 2347.4+1924).
Restricting ourselves to the 11 BL Lac objects ($< z > = 0.6$), where a core and host galaxy was detected, we find that their host galaxies are luminous (M_I = -25.2±0.8) and large (r_e = 10.5±7 kpc). They are on average about 0.6 mag brighter than BL Lac host galaxies at z $\sim$ 0.3 indicative of evolution, whereas their half-light radii are similar.
By combining our data with literature data at low-redshift and applying evolutionary models to them, we show that the properties of the host galaxies of BL Lac objects up to z $\sim$ 1 are compatible with passively evolving elliptical galaxies formed at a redshift of z $\sim$ 2 (13 Gyrs ago in our adopted cosmology).
Our results, however, are affected by an unavoidable luminosity bias and need to be confirmed. Future prospects are described. If they could be confirmed, host galaxies of low-luminosity radio-loud AGN (BL Lac/FR I) have very similar properties to the hosts of radio-quiet QSOs and high-luminosity radio-loud AGN (radio-loud QSO/FR II) over a wide redshift range. This supports the picture of the "Grand Unification" in which AGN activity is a transient phenomenon in galaxy evolution.

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preprint available at http://www.lsw.uni-heidelberg.de/users/jheidt/

On the Relationship Between the Optical Emission-Line and X-ray Luminosities in Seyfert 1 Galaxies

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We have explored the relationship between the [O III] 5007 and the 2–10 keV luminosities for a sample of Broad- and Narrow-Line Seyfert 1 galaxies (BLSy1 and NLSy1, respectively). We find that both types of Seyferts span the same range in luminosity and possess similar [O III]/X-ray ratios. The NLSy1s are more luminous than BLSy1s, when normalized to their central black hole masses, which is attributed to higher mass accretion rates. However, we find no evidence for elevated [O III]/X-ray ratios in NLSy1s, which would have been expected if they had excess EUV continuum emission compared to BLSy1s. Also, other studies suggest that the gas in narrow-line regions (NLR) of NLSy1s and NLSy1s span a similar range in ionization, contrary to what is expected if those of the former are exposed to a stronger flux of EUV radiation. The simplest interpretation is that, like BLSy1s, a large EUV bump is not present in NLSy1s. However, we show that the [OIII]/X-ray ratio can be lowered as a result of absorption of the ionizing continuum by gas close to the central source, although there is no evidence that intrinsic line-of-sight absorption is more common among NLSy1s, as would be expected if there were a larger amount of circumnuclear gas. Other possible explanations include: 1) anisotropic emission of the ionizing radiation, 2) higher gas densities in the NLR of NLSy1s, resulting in lower average ionization, or 3) the presence of strong winds in the the nuclei of NLSy1s which may drive off much of the gas in the narrow-line region, resulting in lower cover fraction and weaker [O III] emission.

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Far Ultraviolet Spectroscopic Explorer Spectroscopy of Absorption and Emission Lines from the Narrow-Line Seyfert 1 Galaxy NGC 4051

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We present three *Far Ultraviolet Spectroscopic Explorer (FUSE)* observations of the Narrow-Line Seyfert 1 galaxy NGC 4051. The most prominent features in the far-ultraviolet (FUV) spectrum are the O VI emission and absorption lines and the H I Lyman series absorption lines which are detected up to the Lyman edge. We also identify weak emission from N III, C III, and He II. The C III line shows absorption while none is detected in the N III and He II lines. In H I and C III we detect two main absorption systems at outflow velocities of -50 ± 30 and -240 ± 40 km s^{-1}, as well as a possible third one at ~-450 km s^{-1}. These systems are consistent in velocity with the 10 absorption systems found previously in C IV, N V, and Si IV, though the individual systems are blended together in the FUV spectrum. We estimate column densities of the two main absorption systems and find that the H I column density is lower for systems with larger outflow velocity. We detect no flux or spectral variations of NGC 4051 at FUV wavelengths during three epochs spanning one year. This is consistent with the optical light curve which shows no variations between the three epochs. It is also consistent with the X-ray light curve which shows consistent flux levels at the three epochs of the *FUSE* observations, although the X-ray light curve shows strong variations on much shorter timescales.

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A binary system of tailed radio galaxies

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We present a detailed study of a binary system of tailed radio galaxies which, along with 3C75, is the only such binary known to exist. The binary is located in a region of low galaxy density at the periphery of a poor cluster Abell S345, but lies close to the massive Horologium Reticulum supercluster. The radio sources have bent tail morphologies and show considerable meandering and wiggling along the jets, which are collimated throughout their lengths. This work presents observations of the large-scale-structure environment of the binary tailed radio sources with a view to examining the influence of large-scale flows on the morphology and dynamics of the associated radio tails. We argue that the orbital motions of the host galaxies together with tidal accelerations toward the supercluster have resulted in the complex structure seen in these radio tails.

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Local Supermassive Black Holes, Relics of Active Galactic Nuclei and the X-ray Background

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We quantify the importance of mass accretion during AGN phases in the growth of supermassive black holes (BH) by comparing the mass function of black holes in the local universe with that expected from AGN relics, which are black holes grown entirely with mass accretion during AGN phases. The local BH mass function (BHMF) is estimated by applying the well-known correlations between BH mass, bulge luminosity and stellar velocity dispersion to galaxy luminosity and velocity functions. We find that different correlations provide the same BHMF only if they have the same intrinsic dispersion. The density of

supermassive black holes in the local universe which we estimate is $\rho_{BH} = 4.6^{+1.9}_{-1.4}\, h^2_{0.7} \times 10^5 M_\odot Mpc^{-3}$. the continuity equation with the only assumption that AGN activity is due to accretion onto massive BH's and that merging is not important. We find that the relic BHMF at $z = 0$ is generated mainly at $z < 3$ where the major part of BH's growth takes place. Moreover, the BH growth is anti-hierarchical in the sense that smaller BH's ($M_{BH} < 10^7 M_\odot$) grow at lower redshifts ($z < 1$) with respect to more massive one's ($z \sim 1 - 3$). perfectly consistent with the local BHMF indicating the local black holes were mainly grown during AGN activity. This agreement is obtained while satisfying, at the same time, the constraints imposed from the X-ray background. The comparison between the local and relic BHMF's also suggests that the merging process is not important in shaping the relic BHMF, at least at low redshifts ($z < 3$), and allows us to estimate the average radiative efficiency (ε), the ratio between emitted and Eddington luminosity (λ) and the average lifetime of active BH's. holes grew during AGN phases in which accreting matter was converted into radiation with efficiencies $\varepsilon = 0.04 - 0.16$ and emitted at a fraction $\lambda = 0.1 - 1.7$ of the Eddington luminosity. The average total lifetime of these active phases ranges from $\simeq 4.5 \times 10^8$ yr for $M_{BH} < 10^8 M_\odot$ to $\simeq 1.5 \times 10^8$ yr for $M_{BH} > 10^9 M_\odot$ but can become as large as $\sim 10^9$ yr for the lowest acceptable ε and λ values.

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E-mail contact: marconi@arcetri.astro.it,
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A new type of photoionized code required for the new era of X-ray spectroscopy

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With the advent of the present and future spatial X-ray missions, it becomes crucial to model correctly the line spectrum of X-ray emitting media such as the photoionized plasma observed in the central regions of Active Galactic Nuclei (AGN), or in X-ray binaries. We have built a photoionization code, Titan, solving the transfer of a thousand lines and of the continuum with the "Accelerated Lambda Iteration" method, which is one of the most efficient and at the same time the most reliable for line transfer. In all other photoionization codes the line intensities are computed with the so-called "escape probability formalism", used in its simplest approximation. In a previous paper (Dumont et al. 2003), it was shown that this approximation leads to a wrong estimation of the emitted X-ray line intensities, especially in the soft X-ray range. The errors can exceed one order of magnitude in the case of thick media (Thomson thickness of the order of unity). In the present paper, we show that it also happens, but for different reasons, in the case of moderately thin media (Thomson thickness of 0.001 to 0.1), characteristic of the Warm Absorber in Seyfert 1 or of the X-ray emitting medium in Seyfert 2. Typically, the errors on the line fluxes and line ratios are of the order of 30% for a column density of 10^{20} cm^{-2}, and a factor five for a column density of 10^{23} cm^{-2}, in conditions giving rise to the spectra observed in these objects. We explain why this problem is less acute in cooler media, like the Broad Line Region of AGN. We show some examples of X-ray spectra appropriate for Seyfert 2 and for the Warm Absorber of Seyfert 1. We conclude that though it is quite important to introduce numerous accurate X-ray data in photoionization codes, it should be accompanied by more elaborate methods than escape probability approximations to solve the line transfer.

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Preprint available at astro-ph/0403009

Optical Variability Of Narrow-Line Seyfert 1 Galaxies

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We present results of a broad-band photometric study of the optical variability of six Narrow-Line Seyfert 1 (NLS1) galaxies observed at 172 epochs. We searched for microvariability on 33 nights. Strong evidence for microvariability was found only for our lowest luminosity object, NGC 4051, on one night. Weaker evidence suggests such variability on a few other nights for two other objects, but the data are not as convincing. Intra-night variability in NLS1s is thus concluded to be rare and of low amplitude. We give illustrations of how variable image quality can produce spurious variability. We find that for well-studied non-NLS1s there is a spread in the amplitude of seasonal variability (i.e., in some years an AGN is more variable than in others). We find that the means of the variability amplitudes of non-NLS1s over several seasons vary from object to object (i.e., some AGNs are, on average, more variable than others). NLS1s also show a spread in seasonal variabilities. The best-studied NLS1, Ark 564, shows a range of amplitudes of variability from season to season that is comparable to the range found in BLS1s, and in one season Ark 564 was as variable as the most variable non-NLS1. The seasonal amplitudes of variability for NLS1s are mostly in the lower half of the range of non-BLS1 seasonal amplitudes, but the absence of a suitable control sample makes a precise comparison difficult. However, on long timescales (weeks to years) NLS1s as a class are not *more* variable than non-NLS1s. The

extreme variability seen in the X-rays was not seen in the optical. This has consequences for the models of AGNs in general as well as NLS1s in particular.

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preprint available at http://www.physics.unl.edu/directory/gaskell/preprints/preprints.html

Witnessing the gradual slow-down of powerful extragalactic jets: The X-ray – optical – radio connection

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A puzzling feature of the *Chandra*–detected quasar jets is that their X-ray emission decreases faster along the jet than their radio emission, resulting to an outward increasing radio to X-ray ratio. In some sources this behavior is so extreme that the radio emission peak is located clearly downstream of that of the X-rays. This is a rather unanticipated behavior given that the inverse Compton nature of the X-rays and the synchrotron radio emission are attributed to roughly the same electrons of the jet's non-thermal electron distribution. In this note we show that this morphological behavior can result from the gradual deceleration of a relativistic flow and that the offsets in peak emission at different wavelengths carry the imprint of this deceleration. This notion is consistent with another recent finding, namely that the jets feeding the terminal hot spots of powerful radio galaxies and quasars are still relativistic with Lorentz factors $\Gamma \sim 2-3$. The picture of the kinematics of powerful jets emerging from these considerations is that they remain relativistic as they gradually decelerate from Kpc scales to the hot spots, where, in a final collision with the intergalactic medium, they slow-down rapidly to the subrelativistic velocities of the hot spot advance speed.

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preprint available at http://arXiv.org/abs/astro-ph/0402317

Long slit spectroscopy of a sample of isolated spirals with and without an AGN

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We present the kinematical data obtained for a sample of active (Seyfert) and non active isolated spiral galaxies, based on long slit spectra along several position angles in the H α line region and, in some cases, in the Ca triplet region as well. Gas velocity distributions are presented, together with a simple circular rotation model that allows us to determine the kinematical major axes. Stellar velocity distributions are also shown. The main result is that active and control galaxies seem to be equivalent in all kinematical aspects. For both subsamples, the departure from pure circular rotation in some galaxies can be explained by the presence of a bar and/or of a spiral arm. They also present the same kind of peculiarities, in particular, S-shape structures are quite common near the nuclear regions. They define very similar Tully-Fisher relations. Emission line ratios are given for all the detected HII regions; the analysis of the [NII]/H α metallicity indicator shows that active and non-active galaxies have indistinguishable disk metallicities. These results argue in favour of active and non-active isolated spiral galaxies having essentially the same properties, in agreement with our previous results based on the analysis of near infrared images. It appears now necessary to confirm these results on a larger sample.

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Large scale simulations of the jet-IGM interaction

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In a parameter study extending to jet densities of 10^{-5} times the ambient one, I have recently shown that light large scale jets start their lives in a spherical bow shock phase. This allows an easy description of the sideways bow shock propagation in that phase. Here, I present new, bipolar, simulations of very light jets in 2.5D and 3D, reaching the observationally relevant scale of > 200 jet radii. Deviations from the early bow shock propagation law are expected because of various effects. The net effect is, however, shown to remain small. I calculate the X-ray appearance of the shocked cluster gas and compare it to Cygnus A and 3C 317. Rings, bright spots and enhancements inside the radio cocoon may be explained.

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preprint available at http://arXiv.org/abs/astro-ph/0402440

Different Velocity Dependences of Physical Conditions of High- and Low-Ionization Lines in Broad-Line Regions

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We present results from a study of high- and low-ionization emission line ratios as a function of projected velocity for a sample of eight active galactic nuclei (AGNs). Our results are based on analysis of high signal-to-noise optical and *Hubble Space Telescope (HST)* UV spectra. Comparing the emission line ratios to those predicted by photoionization models indicates that the physical conditions responsible for the high-ionization emission lines are consistent with a wind, whereas those of the low-ionization lines are consistent with a virialized disk.

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Meetings

The 331. Heraeus Seminar
The Evolution of Starbursts

August 16 - 20, 2004

Bad Honnef, Germany

The Convention Centre of the German Physical Society

Second Announcement

We cordially invite you participate in our meeting.

We want to focus on bringing together different viewpoints on the evolution of starbursts, both from the perspective of the neutral and hot ISM and the stellar component. There will be a focus on the interaction of the ISM and the stellar component, and starbursts in the local universe - though the high-redshift population will not be forgotten. Modes and triggering of star formation in different environments will be addressed as well as the properties and structure of the ISM and feedback processes.

Invited speakers who have confirmed their participation include:

Susanne Aalto (Sweden)
Willem Baan (The Netherlands)
Francoise Combes (France)
Ralf-Juergen Dettmar (Germany)
Phil Diamond (UK)
Jay Gallagher (USA)
Johan Knapen (UK)
Chip Kobulnicky (USA)
Claus Leitherer (USA)
Alan Pedlar (UK)
Nick Scoville (USA, tbc)
Isaac Shlosman (USA)
Linda Tacconi (Germany)
Pat Thaddeus (USA)
Martin Ward (UK)

In this announcement, we would like to draw your attention on the webpage for our meeting, which is located at

http://www.astro.ruhr-uni-bochum.de/starbursts

or

http://www.astro.rub.de/starbursts

On this webpage, you can find up-to-date information on:

- The scientific background
- The scientific programme
- The venue
- Registration and cost

New information will of course be added as it becomes available.

Technical Information:

Registration and Abstracts

We would like to ask you to use our online registration facility to register your intent to participate. We recommend that you register soon, since we have a firm limit of 80 participants.

The deadline for submission of your abstract (via our online upload facility) is **June 30, 2004** - but we hope to get your abstract much earlier, if possible with your registration!

Conference Fee, Payment and Deadline

We are financially supported by the Heraeus Foundation, and are thus able to offer a meeting with an exciting programme (also depending on you!) in a location that is not just very pleasant but also assures lively discussion extending into the evening - at a rate (conference fee and accomodation) that is very attractive indeed.

The conference fee is (only) Euro 200,-.

This includes the conference dinner, an excursion and the proceedings.

We would like to ask European participants to pay the conference fee as soon as possible. The deadline for payment of the conference fee (and thus assured particiption) is **June 30, 2004**, but again, we strongly encourage you to pay soon!

Please notify us (by email or by checking the appropriate button on the registration page) that you have paid!

How to pay:

Participants from Germany
Please make a bank transfer to:

Recipient of payment: Universittskasse Bochum

Bank: Sparkasse Bochum
Account number: 1 300 516
BLZ: 430 500 01

Reason for transfer ('Verwendungszweck'): 01/28211/7044804 (Starburst Conference)

Participants from within Europe:

You will need the BIC and IBAN codes of our bank, the Sparkasse Bochum. These are:
BIC: WELADED1BOC
IBAN: DE57430500010001300516

Please also state that the reason for transfer is 01/28211/7044804 (starburst Conference) - this will tell the university system where the money should go.

Participants from overseas:

Please ask your bank for instructions on how to do the transfer. For participants from the USA, we already found out that a transfer has to be done through Citibank New York and Westdeutsche Landesbank to Sparkasse Bochum, using the BIC Code and the account number (and the reason for transfer). We will also accept cash payment from overseas participants at the time of the meeting. Please assure us in this case that you will definitely attend!

Accomodation

The rates for full board at the convention centre, where most participants should stay, are (slightly preliminary)
~Euro 35,- (if you share a room)
~Euro 50,- (if you prefer a single room) They include full board, i.e. three meals a day plus coffee breaks!

You can pay for your accomodation at the meeting itself.

Please tell us (by mail or -very soon- by checking the appropriate button on the registration page) whether you would prefer a single or a double room - please check out the additional information on our webpage to help you decide! In case the Convention Centre fills up too quickly, we will arrange for overflow accomodation in the vicinity, which may, however, be more expensive. Being willing to share a room might help avoid this.

The Active Galaxies Newsletter is available on the World Wide Web. You can access it via the University of Manchester home page :- http://www.ast.man.ac.uk/~rb/agn/
If you move or your e-mail address changes, please send the editor your new address. If the Newsletter repeatedly bounces back from an address then that address is deleted from the mailing list.