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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.

Happy New Year to all subscribers of the Active Galaxies Newsletter

Rob Beswick

Abstracts of recently accepted papers

Discovery of hard X-ray features around the hotspots of Cygnus A

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We present results of analysis of a *Chandra* observation of Cygnus A in which the X-ray hotspots at the ends of the jets are mapped in detail. A hardness map reveals previously unknown structure in the form of outer and inner hard arcs around the hotspots, with hardness significantly enhanced compared with the hotspot central regions. The outer hard arcs may constitute the first detection of the bow shock; the inner hard arcs may reveal where the jets impact on the hotspots. We argue that these features cannot result from electrons radiating by the synchrotron self-Compton process. Instead we consider two possible sources of the hard emission: the outer arcs may be due to thermal radiation of hot intracluster gas compressed at the bow shock. Alternatively, both outer and inner arcs may be due to synchrotron radiation of electrons accelerated in turbulent regions highly perturbed by shocks and shear flows. Comparison of measured hardness ratios with simulations of the hardness ratios resulting from these processes show that it is more difficult to explain the observations with a thermal model. Although we cannot rule out a thermal model, we argue in favour of the non-thermal explanation. The hard regions in the secondary hotspots suggest that jet activity is still powering these hotspots.

Accepted by Mon. Not. R. Astr. Soc.

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preprint available at http://xxx.soton.ac.uk/abs/astro-ph/0411502

Herschel and Galaxies/AGN

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Herschel will represent a breakthrough in the study of nearby gas-rich and gas-poor galaxies, as it will for the first time permit imaging photometric and spectroscopic observations of their ISM in the FIR-submm wavelength range. The unprecedented sensitivity and angular resolution of Herschel will furthermore yield a breakthrough in our understanding of distant galaxies and AGN, as their gas and dust – both the ISM- and the AGN-related – will for the first time come within reach. Herschel will undoubtedly yield major discoveries concerning the cosmologically evolving gas and dust properties in galaxies, back to very early epochs.

Invited review, at Paris Conference "The Dusty and Molecular Universe – A Prelude to Herschel and ALMA", ESA-SP, in press

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preprint available at http://arxiv.org/abs/astro-ph/0411659

The Core of NGC 6240 from Keck Adaptive Optics and HST NICMOS Observations

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We present results of near infrared imaging of the disk-galaxy-merger NGC 6240 using adaptive optics on the Keck II Telescope and reprocessed archival data from NICMOS on the Hubble Space Telescope. Both the North and South nuclei of NGC 6240 are clearly elongated, with considerable sub-structure within each nucleus. In K' band there are at least two point-sources within the North nucleus; we tentatively identify the south-western point-source within the North nucleus as the position of one of the two AGNs. Within the South nucleus, the northern sub-nucleus is more highly reddened. Based upon the nuclear separation measured at 5 GHz, we suggest that the AGN in the South nucleus is still enshrouded in dust at K' band, and is located slightly to the north of the brightest point in K' band. Within the South nucleus there is strong H2 1-0 S(1) line emission from the northern sub-nucleus, contrary to the conclusions of previous seeing-limited observations. Narrowband H2 emission-line images show that a streamer or ribbon of excited molecular hydrogen connects the North and South nuclei. We suggest that this linear feature corresponds to a bridge of gas connecting the two nuclei, as seen in computer simulations of mergers. Many point-like regions are seen around the two nuclei. These are most prominent at 1.1 microns with NICMOS, and in K'-band with Keck adaptive optics. We suggest that these point-sources represent young star clusters formed in the course of the merger.

Accepted by Astrophysical J.

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preprint available at http://arxiv.org/abs/astro-ph/0411590

SED models of AGN

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Present AGN models aiming to account for the observed infrared SEDs consider a physical description of the dust and a solution of the radiative transfer problem. Mid infrared spectra obtained at different spatial scales are presented. They show that PAH bands are detected in starburst regions but significantly reduced near the centre of AGN. This may be explained by examining the heating mechanism of PAHs after hard photon interactions. On the radiative transfer side first a most economic model is presented where three parameters, luminosity, effective size and extinction of the nucleus are varied to obtain SED fits. A full grid of model spectra are made available at: `http://www.eso.org/~rsiebenm/agn_models/`. This model is sufficient to account for ISO broad band data of a sample of 68 radio galaxies and quasars of the 3CR catalogue. The hot dust component detected is mainly due to small grains and PAHs. In such models, type 1 AGNs are represented by a compact dust distribution with warm grains and weak PAH emission. In AGNs of type 2, the dust appears to be more extended, relatively colder and PAH bands are strong. Realistic AGN models which are consistent with the unification need to explain the overall absence of the 9.7μm silicate emission feature. This can be done by considering various geometries (tapered discs). Models which combine AGN and starburst activity are presented for galaxies with hidden broad line region. It is found that the AGN torus dominate

the mid IR continuum emission and that the starbursts dominate the PAH band as well as the far infrared and submillimeter emission.

In: "The Spectral Energy Distribution of Gas-Rich Galaxies: Confronting Models with Data", Heidelberg, 4-8 Oct. 2004, eds. C.C. Popescu & R.J. Tuffs, AIP Conf. Ser., in press

E-mail contact:rsiebenm@eso.org,
preprint available at http://arxiv.org/abs/astro-ph/0412023

Investigating the EGRET-radio galaxies link with INTEGRAL: the case of 3EG J1621 + 8203 and NGC 6251

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The analysis of an *INTEGRAL* AO2 observation of the error contours of the EGRET source 3EG J1621 + 8203 is presented. The only source found inside the error contours for energies between 20 and 30 keV at 5σ detection significance is the FR I radio galaxy NGC 6251. This supports the identification of NGC 6251 with 3EG J1621 + 8203. The observed flux is higher and softer than observed in the past, but consistent with a variable blazar-like spectral energy distribution.

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Kinematic Study of the Blazar S5 0716+714

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We present the results of a multi-frequency study of the structural evolution of the VLBI jet in the BL Lac object 0716+714 over the last 10 years. We show VLBI images obtained at 5 GHz, 8.4 GHz, 15 GHz and 22 GHz. The milliarcsecond source structure is best described by a one-sided core-dominated jet of ~ 10 mas length. Embedded jet components move superluminally with speeds ranging from $5\,c$ to $16\,c$ (assuming $z = 0.3$). Such fast superluminal motion is not typical for BL Lac objects, however **it** is still in the range of jet speeds typically observed in quasars ($10\,c$ to $20\,c$). In 0716+714, younger components, that were ejected more recently, seem to move systematically slower than the older components. This and a systematic position angle variation of the inner (1 mas) portion of the VLBI jet, suggests an at least partly geometric origin of the observed velocity variations. The observed rapid motion and the derived Lorentz factors are discussed with regard to the rapid **I**ntra-**D**ay **V**ariability (IDV) and the γ-ray observations, from which very high Doppler factors are inferred.

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The Halo, Hot Spots and Jet/Cloud Interaction of PKS 2153–69

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We report Chandra X-ray Observatory and 1.4 GHz Australian Long Baseline Array (LBA) observations of the radio galaxy PKS 2153–69 and its environment. The Chandra image reveals a roughly spherical halo of hot gas extending out to 30 kpc around PKS 2153–69. Two depressions in the surface brightness of the X-ray halo correspond to the large scale radio lobes, and interpreting these as cavities inflated with radio plasma we infer a jet power of 4×10^{42} $erg\,s^{-1}$. Both radio lobes contain hot spots that are detected by Chandra. In addition, the southern hot spot is detected in the 1.4 GHz LBA observation, providing the highest linear resolution image of a radio lobe hot spot to date. The northern hot spot was not detected in the LBA observation. The radio to X-ray spectra of the hot spots are consistent with a simple power law emission model. The nucleus has an X-ray spectrum typical of a type 1 active galactic nucleus, and the LBA observation shows a one-sided nuclear jet on $0.1''$ scales. Approximately $10''$ northeast of the nucleus, X-ray emission is associated with an extra-nuclear cloud. The X-ray emission from the cloud can be divided into two regions, an unresolved western component associated with a knot of radio emission (in a low resolution map), and a spatially extended eastern component aligned with the pc-scale jet and associated with highly ionized optical line-emitting clouds. The X-ray spectrum of the eastern component is very soft ($\Gamma > 4.0$ for a power law model or $kT \simeq 0.22$ keV for a thermal plasma). The LBA observation did not detect compact radio emission from the extra-nuclear cloud. We discuss both jet precession and jet deflection models to account for the progressively increasing position angle from the northern hot spot to the western component of the jet/cloud interaction region to the direction of the pc-scale jet. In the precession model the particle beam impacts the western region while the radiation beamed from the nucleus photoionizes the eastern region and is scattered into our line of sight by dust giving rise to the polarized optical emission and possibly the soft X-ray emission. If the X-ray emission from the eastern region really is dust-scattered nuclear radiation, it would be the first detection of such emission from an external galaxy. The nearby galaxy MRC 2153–699 is also detected by Chandra.

Accepted for publication in the Astrophysical Journal. It is tentatively scheduled for the ApJ 10 April 2005, v623 1 issue

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Dwarf Seyfert 1 Nuclei and the Low-Mass End of the $M_{\rm BH} - \sigma$ Relation

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To examine the relationship between black hole mass and host galaxy velocity dispersion for low black hole masses, we have measured the velocity dispersions of 15 Seyfert 1 galaxies from the catalog of Greene & Ho (2004). These Seyferts were selected from the Sloan Digital Sky Survey to have estimated black hole masses below 10^6 $M_\odot$. The data are consistent with a straightforward downward extrapolation of the local $M_{\rm BH} - \sigma$ relation, indicating that this correlation extends over a range of more than four orders of magnitude in black hole mass. The rms scatter of the sample about the extrapolated $M_{\rm BH} - \sigma$ relation is 0.57 dex, consistent with the expected scatter of single-epoch mass estimates for Seyfert 1 galaxies.

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The XMM-Newton spectrum of the high-z optically-obscured QSO RX J1343.4+0001: a classic radio quiet QSO

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We present a 30 ks *XMM-Newton* observation of the $z = 2.35$ Type II radio quiet quasar RX J1343.4+0001. These data provide the first good quality X–ray spectrum for this object. We measured a continuum slope $\Gamma = 1.85 \pm 0.10$ with only an upper limit on the column density of the absorbing material of $N_H^z \leq 10^{22}$ cm^{-2} as well as an Fe Kα emission line at the 3σ confidence level. We do not find therefore a highly absorbed object nor a truly flat spectrum as suggested on the basis of previous less sensitive *ROSAT* and *ASCA* measurements. The N_H^z upper limit is fully consistent with the optical extinction $3 < A_V < 10$ inferred from IR observations. The Fe Kα line is consistent with fluorescence from neutral iron and, noteworthy, is one of the most distant observed so far. The X–ray spectral properties of RX J1343.4+0001 agree well with the steep continuum slope ($\Gamma \approx 1.9$) being independent of increasing redshift and luminosity as inferred by X–ray studies of large samples of RQ QSOs.

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Meetings

Blazar Variability Workshop II: - *Entering the GLAST Era*
Florida International University
Miami, Florida USA
10-12 April, 2005

Conference goals are to review existing observations, present new observations, discuss theoretical models and speculate on the future paths of Blazar Variability and high energy research. The conference will include 14 invited talks, many contributed oral talks and poster papers. The venue is optimized for participant interaction and time is allowed for discussion of the observations, theoretical developments and problems in the field of Blazars.

Invited Speakers:-

- James Webb - Multiwavelength Campaigns
- Margo Aller - Radio Variability
- H. R. Miller - Optical Variability
- Rita Sambruna - X-ray Variability
- Paul Wiita - Instabilities in Disks and Jets
- David Meier- Numerical Simulations of Jets
- Philip Hardee - Jet Instabilities
- David Thompson - Gamma-Rays
- Henric Krawczynski - TeV Emission
- Matt Lister - VLBI Surveys
- Alan Marscher - VLBI Imaging and Radio-High Frequency Connections
- Nektarios Vlahakis - Disk-Jet Connection
- Grzegorz Madejski - High Energy Future

The number of attendees is restricted by venue size to 70 people, on a first come, first served basis. Participants can present either a 10 minute oral talk or poster paper. It is likely that the proceedings will be published through ASP conference series

Registration deadline February 1, 2005

For more information visit the conference web site: **www.fiu.edu/∼webbj/confer.htm**
Any further enquiries can be directed to Dr James R. Webb at: webbj@fiu.edu.

Announcments

The Interplay Among Black Holes, Stars and ISM in Galactic Nuclei

Proceedings of the 222 Symposium of the International Astronomical Union
Held in Gramado, Rio Grande do Sul, Brazil
March 1-5, 2004

Eds. Thaisa Storchi-Bergmann[1], Luis C. Ho[2] and Henrique R. Schmitt[3]

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We announce the availability of the Proceedings of IAUS 222, both in hardcopy and pdf files of the individual contributions (see URL address below).

The volume is organized in 6 Sessions: (1) Supermassive black holes; (2) Stars, star clusters and stellar populations; (3) Insterstellar medium; (4) Connections and feedback; (5) Galaxy evolution; (6) Instrumentation and other topics.

The novel aspect we have tried to imprint to the conference and the book is the view of AGN as a phase in the life of a galaxy. By understanding the interplay between the nuclear black hole, stars and ISM, we will understand how galaxy evolution proceeds. Highlights of the works included in this volume are: (1) The masses of the largest and smallest nuclear black holes; (2) The first resolved observation of an obscuring structure (torus) around an active nucleus; (3) Simulations proposing a solution to the stability problem of a circumnuclear torus; (4) X-ray flares as evidences for tidally disrupted stars by nuclear black holes; (5) Star clusters and stellar population properties in active, star-forming and non-active galaxies; (6) Outflows observed in different wavelength ranges, scales and evolutionary phases of a galaxy; (7) Accretion disk winds and how they can be used to explain why disk-like emission-line profiles can only be observed in low-luminosity AGNs; (8) The origin of jets and their properties in radio-quiet AGNs; (9) The feeding processes of AGN, and the difficulties in finding observational signatures of these processes; (10) The role of nuclear spirals and bars in the feeding; (12) The observations of velocity dispersion drops (or "sigma drops") in the nuclear region of active and star-forming galaxies; (13) Comparison between properties of gas and dust in distant and local AGN; (14) Cosmological models showing how a nuclear black hole can grow inside a galaxy bulge resulting in the observed black hole-galaxy correlations.

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pdf files of the papers are available at the URL http://journals.cambridge.org/jid_IAU

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> 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.