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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

Streaming Motions Towards the Supermassive Black Hole in NGC 1097

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We have used GMOS-IFU and high resolution HST-ACS observations to map, in unprecedented detail, the gas velocity field and structure within the 0.7 kpc circumnuclear ring of the SBb LINER/Seyfert 1 galaxy NGC 1097. We find clear evidence of radial streaming motions associated with spiral structures leading to the unresolved (< 3.5 parsecs) nucleus, which we interpret as part of the fueling chain by which gas is transported to the nuclear starburst and supermassive black hole.

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E-mail contact: kambiz@cis.rit.edu,
preprint available at http://xxx.lanl.gov/abs/astro-ph/0602002

The Narrow Line Region of the Seyfert 2 galaxy Mrk 78. An infrared view

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We report near-infrared spectroscopic data for the Seyfert 2 galaxy Mrk 78, taken with the LIRIS near-infrared camera/spectrometer at the William Herschel Telescope (WHT). The long-slit spectra clearly show extended emission. The resolution and depth of the near-infrared spectra allows the examination of its morphology and ionization regions, and a direct comparison with similarly deep visible spectra. The emission-line ratios obtained are used to derive the extinction towards the nucleus. The detection of strong features such as [Fe II], H_2, hydrogen recombination lines, and the coronal [Si VI]λ1.962 line is used to study the kinematics and excitation mechanisms occurring in Mrk 78, revealing that despite of the strong radio-jet interaction present in this object, photoionization from the active nucleus dominates the narrow line region emission, while UV fluorescence is the source of the H_2 emission. Lines with extended emission yield velocity distributions with an amplitude of about 600 km s^{-1},

the consequence of an eastern lobe moving away from us plus a western lobe with the opposite contribution. We used the photoionization code CLOUDY to recreate a typical narrow line region region, to derive the ionization parameter, and to compare our spectral data with diagnostic diagrams.

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E-mail contact: cra@iac.es
preprint available at http://arxiv.org/abs/astro-ph/0603420

Improved constraints on the cosmological parameters using the VLA FIRST survey

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Using the final version of the VLA FIRST survey (Becker et al. 2003), the optical Sloan Digital Sky Survey Data Release 3 (DR3) quasar list and a series of carefully selected criteria, we have defined the largest homogeneous population of double-lobed sources. With the precise sample definition, the increased depth and sensitivity of the survey data, the large size of the dataset, and our self-consistent method of analysis, which addresses many of the problems associated with previous work in the area, we are able to: a) explore the correlations between the intrinsic properties of the double-lobed radio sources (the results are also confirmed by a non-parametric analysis) and study their evolution, b) place more interesting and tighter constraints on the cosmological parameters, distinguish among the different cosmology models, and determine the impact of the angular size-redshift studies in cosmology, c) further our understanding of the behavior of the intergalactic medium (IGM) density as a function of redshift and shed more light to the quasar-radio galaxy unification issue.

American Institute of Physics (AIP) Conference Series "Recent Advances in Astronomy and Astrophysics"

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preprint available at http://arxiv.org/abs/astro-ph/0603548

Linear radio structures in selected Seyfert and LINER galaxies

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High resolution MERLIN 5 GHz observations (0.04") of 7 Seyfert galaxies, selected as the ones previously showing evidence of collimated ejection, have been compared with high resolution archive HST data. The radio maps reveal rich structures in all the galaxies. NGC 2639 and TXFS 2226-184 have multiple knot parsec-scale extended structures, Mrk 1034, Mrk 1210, NGC 4922C and NGC 5506 reveal one-sided jets, while IC 1481 exhibits a jet-like extension. The close correlation between the radio-emitting relativistic plasma and the ionized gas in the inner regions of these galaxies allows us to study in detail the physics close to the center of low luminosity AGN.

American Institute of Physics (AIP) Conference Series "Recent Advances in Astronomy and Astrophysics"

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preprint available at http://arxiv.org/abs/astro-ph/0603549

The Cavity of Cygnus A

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In this paper, we focus on the limb-brightened, prolate spheroidal cavity of the radio galaxy Cygnus A, as revealed by the Chandra X-ray Observatory. We use the shock heated, thermal intracluster medium around the expanding cavity to infer the properties of the radio synchrotron-emitting gas inside the cavity. The gas along the N and S edges of the cavity is found to have an average temperature of 6.0 keV, which is hotter than the temperature (4.6 keV) of the adjacent intracluster gas. It is

proposed that this hotter gas is intracluster gas shocked by the expanding cavity. The shock is thus inferred to be weak (Mach number 1.3, a value also inferred from the density jump at the cavity edge) and its velocity 1,030 km s^{-1}. The total kinetic power of the expansion is found to be 4.1 $\times$ 10^{45} erg s^{-1}, which is somewhat larger than both the total radio power and the power emitted by the entire intracluster medium in the 2 – 10 keV band. It appears that most of the power of the jets in Cygnus A is currently going into heating the intracluster medium. From the derived pressure inside the cavity, there is no conclusive evidence for a component contributing pressure additional to the magnetic fields and relativistic particles responsible for the synchrotron radio emission. Further, the ratio of energy densities in positive to negative cosmic rays in Cygnus A must be $\ll$ 100 (the value in our Galaxy).

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Space-VLBI polarimetry of the BL Lac object S5 0716+714: Rapid polarization variability in the VLBI core

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To determine the location of the intra-day variable (IDV) emission region within the jet of the BL Lac object S5 0716+714, a multi-epoch VSOP polarization experiment was performed in Autumn 2000. To detect, image, and monitor the short term variability of the source, three space-VLBI experiments were performed with VSOP at 5 GHz, separated in time by six days and by one day. Quasi-contemporaneous flux density measurements with the Effelsberg 100 m radio telescope during the VSOP observations revealed variability of about 5 % in total intensity and up to 40 % in linear polarization in less than one day. Analysis of the VLBI data shows that the variations are located inside the VLBI core component of 0716+714. In good agreement with the single-dish measurements, the VLBI ground array images and the VSOP images, both show a decrease in the total flux density of $\sim$ 20 mJy and a drop of $\sim$ 5 mJy in the linear polarization of the VLBI core. During the observing interval, the polarization angle rotated by about 15 degrees. No variability was found in the jet. The high angular-resolution VSOP images are not able to resolve the variable component and set an upper limit of < 0.1 mas to the size of the core component. From the variability timescales we estimate a source size of a few micro-arcseconds and brightness temperatures exceeding 10^{15} K. We discuss the results in the framework of source-extrinsic (interstellar scintillation induced) and source-intrinsic IDV models.

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15 years of VLBI observations of two compact radio sources in Messier 82

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We present the results of a second epoch of 18 cm global Very Long-Baseline Interferometry (VLBI) observations, taken on 23 February 2001, of the central kiloparsec of the nearby starburst galaxy Messier 82. These observations further investigate the structural and flux evolution of the most compact radio sources in the central region of M82. The two most compact radio objects in M82 have been investigated (41.95+575 and 43.31+592). Using this recent epoch of data in comparison with our previous global VLBI observations and two earlier epochs of European VLBI Network observations we measure expansion velocities in the range of 1500–2000 km s^{-1} for 41.95+575, and 9000–11000 km s^{-1} for 43.31+592 using various independent methods. In each case the measured remnant expansion velocities are significantly larger than the canonical expansion velocity (500 km s^{-1}) of supernova remnants within M82 predicted from theoretical models. In this paper we discuss the implications of these measured expansion velocities with respect to the high density environment that the SNR are expected to reside in within the centre of the M82 starburst.

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Multiwavelength Monitoring of the Dwarf Seyfert 1 Galaxy NGC 4395. II. X-ray and Ultraviolet Continuum Variability

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We report on two *Chandra* observations, and a simultaneous *Hubble Space Telescope* ultraviolet observation, of the dwarf Seyfert 1 galaxy NGC 4395. Each *Chandra* observation had a duration of ∼30 ks, with a separation of ∼50 ks. The spectrum was observed to harden between these observations via a scaling down of the soft-band flux. The inter-observation variability is in a different sense to the observed variability within each observation and is most likely the result of increased absorption. Spectral variations were seen during the first observation suggesting that the X-ray emission is produced in more than one disconnected region. We have also re-analyzed a ∼17 ks *Chandra* observation conducted in 2000. During the three *Chandra* observations the 2–10 keV flux is about a factor of 2 lower than seen during an *XMM-Newton* observation conducted in 2003. Moreover, the fractional variability amplitude exhibited during the *XMM-Newton* observation is significantly softer than seen during the *Chandra* observations. A power-spectral analysis of the first of the two new *Chandra* observations revealed a peak at 341 s with a formal detection significance of 99 %. A similar peak was seen previously in the 2000 *Chandra* data. However, the detection of this feature is tentative given that it was found in neither the second of our two new *Chandra* observations nor the *XMM-Newton* data, and it is much narrower than expected. The *Hubble Space Telescope* observation was conducted during part of the second *Chandra* visit. A zero-lag correlation between the ultraviolet and X-ray fluxes was detected with a significance of ∼99.5 %, consistent with the predictions of the two-phase model for the X-ray emission from active galactic nuclei.

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Systematic Effects in Measurement of Black Hole Masses by Emission-Line Reverberation of Active Galactic Nuclei: Eddington Ratio and Inclination

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Scatter around the relationship between central black hole masses in active galactic nuclei (AGNs) obtained by reverberation-mapping methods and host-galaxy bulge velocity dispersion indicates that the masses are uncertain typically by a factor of about three. In this paper, we try to identify the sources and systematics of this uncertainty. We characterize the broad Hβ emission-line profiles by the ratio of their full-width at half maximum (FWHM) to their line dispersion, i.e., the second moment of the line profile. We use this parameter to separate the reverberation-mapped AGNs into two populations, the first with narrower Hβ lines that tend to have relatively extended wings, and the second with broader lines that are relatively flat-topped. The first population is characterized by higher Eddington ratios than the second. Within each population, we calibrate the black-hole mass scale by comparison of the reverberation-based mass with that predicted by the bulge velocity dispersion. We also use the distribution of ratios of the reverberation-based mass to the velocity-dispersion mass prediction in a comparison with a "generalized thick disk" model in order to see if inclination can plausibly account for the observed distribution. We find that the line dispersion is a less biased parameter in general than FWHM for black hole mass estimation, although we show that it is possible to empirically correct for the bias introduced by using FWHM to characterize the emission-line width. We also argue that inclination effects are apparent only in some small subset of the reverberation-based mass measurements; it is primarily the objects with the narrowest emission lines that seem to be most strongly affected. Our principal conclusion is that the Hβ profile is sensitive primarily to Eddington ratio, but that inclination effects play a role in some cases.

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The Correlation of Narrow Line Emission and X-ray Luminosity in Active Galactic Nuclei

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We combine emission line and X-ray luminosities for 45 sources from the i*Chandra* Deep Field South (CDF-S), and seven HELLAS sources, to obtain a new sample of 52 X-ray selected type-II active galactic nuclei (AGNs). Eighteen of our sources are very luminous with a typical, absorption-corrected 2–10 keV luminosity of $few \times 10^{44}$ erg/sec (type-II QSOs). We compare the emission line properties of the new sources with emission line and X-ray luminosities of known low redshift, mostly lower luminosity AGNs by using a composite spectrum. We find that $L_{[OIII]}/L_{2-10}$ and $L_{[OII]}/L_{2-10}$ decrease with L(2-10 keV) such that $L_{[OIII]}/L_{2-10} \propto L_{2-10}{}^{-0.42}$. The trend was already evident, yet neglected in past low redshift samples. This lead to erroneous calibration of the line-to-X-ray luminosity in earlier AGN samples. The analysis of several type-I samples shows the same trend with a similar slope but a median $L_{[OIII]}/L_{2-10}$ which is larger by a factor of about two compared with optically selected type-II samples. We interpret this shift as due to additional reddening in type-II sources and comment in general on the very large extinction in many type-II objects and the significantly smaller average reddening of the SDSS type-II AGNs. The decrease of $L_{[OIII]}/L_{2-10}$ with L(2–10 keV) is large enough to suggest that a significant fraction of high luminosity high redshift type-II AGNs have very weak emission lines that may have escaped detection in large samples. A related decrease of EW([OIII]) with optical continuum luminosity is demonstrated by an analysis of 12,000 type-I SDSS AGNs. The new correlations found here are important for deriving accurate luminosity functions for AGNs and their neglect may explain past discrepancies between emission line and X-ray samples.

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An Internet Database of Ultraviolet Lightcurves for Seyfert Galaxies

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Using the Multimission Archives at Space Telescope (MAST), we have extracted spectra and determined continuum light curves for 175 Seyfert Galaxies that have been observed with the *International Ultraviolet Explorer (IUE)* and the Faint Object Spectrograph (FOS) on the *Hubble Space Telescope (HST)*. To obtain the light curves as a function of Julian Date, we used fix bins in the object's rest frame, and measured small regions (between 30 and 60 Å) of each spectrum's continuum flux in the range 1150 Å to 3200 Å. We provide access to the UV light curves and other basic information about the observations in tabular and graphical form via the Internet at `http://www.chara.gsu.edu/PEGA/IUE/`.

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preprint available at http://arxiv.org/abs/astro-ph/0603800

Kinematics of the Narrow-Line Region in the Seyfert 2 Galaxy NGC 1068: Dynamical Effects of the Radio Jet

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We present a study of high-resolution long-slit spectra of the narrow-line region (NLR) in NGC 1068 obtained with the Space Telescope Imaging Spectrograph (STIS) aboard *The Hubble Space Telescope (HST)*. The spectra were retrieved from the Multimission Archive at Space Telescope (MAST) obtained from two visits and seven orbits of *HST* time. We also obtained MERLIN radio maps of the center of NGC 1068 to examine the dependence of the NLR cloud velocities on the radio structure. The radial velocities and velocity dispersions of the bright NLR clouds appear to be unaffected by the radio knots, indicating that the radio jet is not the principal driving force on the outflowing NLR clouds. However, the velocities of the fainter NLR clouds

are split near knots in the jet, indicating a possible interaction. Biconical outflow models were generated to match the data and for comparison to previous models done with lower dispersion observations. The general trend is an increase in radial velocity roughly proportional to distance from the nucleus followed by a linear decrease after roughly 100 parsec similar to that seen in other Seyfert galaxies, indicating common acceleration/deceleration mechanisms.

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A preprint with high resolution figures is available at: http://www.chara.gsu.edu/ das/ngc1068.pdf
A version with medium resolution figures is available at: http://arxiv.org/abs/astro-ph/0603803

The Host Galaxies of Narrow-Line Seyfert 1s: Nuclear Dust Morphology and Starburst Rings

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We present a study of the nuclear morphology of a sample of narrow- and broad-line Seyfert 1 galaxies (NLS1's and BLS1's) based on broad-band images in the *Hubble Space Telescope* archives. In our previous study, we found that large-scale stellar bars at > 1 kpc from the nucleus are more common in NLS1's than BLS1's. In this paper we find that NLS1's preferentially have grand-design dust spirals within ~ 1 kpc of their centers. We also find that NLS1's have a higher fraction of nuclear star-forming rings than BLS1's. We find that many of the morphological differences are due to the presence or absence of a large-scale stellar bar within the spiral host galaxy. In general, barred Seyfert 1s tend to have grand-design dust spirals at their centers, confirming the results of other researchers. The high fraction of grand-design nuclear dust spirals and stellar nuclear rings observed in NLS1's host galaxies suggests a means for efficient fueling of their nuclei to support their high Eddington ratios.

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preprint available at http://www.chara.gsu.edu/∼deo/preprints.html or http://arxiv.org/abs/astro-ph/0603806

Thesis

Host galaxies and environments of compact extragalactic radio sources

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Ph.D dissertation directed by: P.D. Barthel, C.P. O'Dea, R.C. Vermeulen

Ph.D degree awarded: February 2006

The main goal of this thesis is to study the interrelation of powerful radio sources with their hosts. The objects of study are GHz Peaked Spectrum (GPS) and Compact Steep Spectrum Sources (CSS) radio sources. Due to their small size, GPS/CSS sources are excellent probes of this relation. Furthermore, their young age allows us to compare them to the larger, old radio sources and establish a time-line evolution of this relation.

This thesis combines imaging and spectroscopy of GPS/CSS sources at different wavelengths, and all our studies lead to the same conclusion: the presence and expansion of powerful radio sources clearly affect the properties and evolution of their hosts. All chapters of the thesis (excluding the sample studies, chapters 2 and 3) find evidence of strong interaction between the host and the radio source. Furthermore, the radio source and host can significantly affect each others evolution. However, this influence takes place in different ways. The influence that the host has on the radio source is somehow indirect. However it can completely change its destiny: depending of the contents, distribution and density of the gas, the radio source will die early, expand and grow into the large FR sources, or remain confined inside its host. In contrast, the influence of the radio source on its host seems to be more direct and takes place during its expansion through the host: the radio source will affect the kinematics and ionization of the emission line gas, and may change the star formation history of the host.

Briefly, the main results that lead to this conclusion are:

1 Presence of shock ionized gas in 3C67, 3C277.1 and 3C303.1 (Chapter 4).

2 HI gas associated to the emission line gas in 3C 49 and 3C 268.3 and the presence of outflows in B2050+364 (Chapters 5 and 6).

3 Possible events of star formation related to the triggering of the radio source and findings of jet induced star formation in 1814–637 and 3C 303.1, which is also the source showing the strongest contribution from shocks to the ionization of the emission line gas (Chapter 7).

The complete thesis or the separate chapters can be downloaded from:
http://dissertations.ub.rug.nl/faculties/science/2006/a.labiano.ortega/

Meetings

Workshop Announcement

Variable and Broad Iron Lines around Black Holes Monday 26th - Wednesday 28th June 2006
XMM-Newton Science Operations Centre at ESA's European Space Astronomy Centre, Madrid, Spain

Webpage: http://xmm.esac.esa.int/external/xmm_science/workshops/2006_science/
Email: ws2006@sciops.esa.int

Introduction
The XMM-Newton Science Operations Centre is organising a workshop that will focus on the iron line emitted around accreting black holes concentrating on results and discoveries from XMM-Newton, Chandra and Suzaku, as well as other current missions, and on theoretical progress.

Purpose and goals
Broad iron lines have been observed in the X-ray spectra of some Active Galactic Nuclei (AGN) and accreting Galactic Black Holes (GBH). The widths of the lines indicate that the emission originates close to the black hole where strong gravity effects dominate. Variable lines, often with red or blue shifts are also seen, which also come from the inner regions. The broad and variable lines are believed to be due to X-ray reflection from the accretion flow, and to reveal its geometry and dynamics.

Alternative interpretations involving complex absorption introduce some ambiguity which is now being reduced with new data showing evidence for further reflection features such as the soft excess and Compton hump.

We plan an in-depth review of the data and interpretation, and discussion of future challenges.

Topics
At present we have identified the following general topics (the first 3 are more observational and the last 2 more theoretical):

- Broad iron lines and reflection in AGN
- Broad iron lines and reflection in Black Hole Candidates
- Variable shifted lines
- X-ray reflection and spectral variability
- Understanding the innermost flows around Black Holes

Scientific Organizing Committee

A. Fabian	(Institute of Astronomy, Cambridge, UK) (Chair)
N. Schartel	(ESAC, Spain) (Co-Chair)
S. Bianchi	(ESAC, Spain)
T. Boller	(MPE, Germany)
G. Matt	(Universita' degli Studi Roma Tre, Italy)
J. Miller	(University of Michigan, USA)
K. Nandra	(Imperial College London, UK)
D. Porquet	(MPE, Germany)
C. Reynolds	(University of Maryland, USA)
Y. Tanaka	(MPE, Germany)
J. Turner	(NASA/GSFC, USA)

The deadline for registration and abstract submission is the **5th of May 2006**. Authors will be notified of the decision of the Scientific Organizing Committee before the end of May 2006.

E-mail contact: ws2006@sciops.esa.int; The registration form and further details on the workshop are available from http://xmm.esac.esa.int/external/xmm_science/workshops/2006_science/ .

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.