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

Since this is the 7th 'birthday' for the Active Galaxies Newsletter and the 79th edition, as editor, I thought I would take this opportunity to thank all of the subscribers and contributors who make running this newsletter both possible and worthwhile. Thank you all!

Since October 1996 the Active Galaxies Newsletter has had three different editors (Ant Holloway, Matt Redman & myself) and has distributed 836 contributions of various forms. Throughout the newsletters existence accepted journal and conference abstracts have been the main stay of the newsletter representing over 90% of the included items. At present there are over 500 subscribers and the web-page has had over 3000 hits in the last 10 months alone.

For a bit of fun I thought I would try and work out a few random facts from contributions to the newsletter. For example, who, out of the many contributors to the newsletter, have been mentioned the most in articles over the last 7 years? What is the most mentioned telescope?

To answer the first of these questions he top 2 authors names mentioned in the newsletter are Luis C. Ho (63 times!) closely followed by Stefanie Komossa (50 times) Whow! Thanks to the both of you. Each of you have basically contributed 5 issues each! Although at this point I shouldn't forget the many countless other contributers every contribution counts! As second question well doing a very simple (and very unscientific word search) *HST* gets mentioned some 169 times, followed by *ROSAT* (152) , *Chandra* (148). Anyway enough frivolity maybe I'll produce some more random facts about the newsletter for the next issue.

Lastly thanks to all the contributers, subscribers and casual readers that make this newsletter worthwhile.

Rob Beswick

p.s. For the sharp ones amoung you (and theres always someone who will email me pointing out mistakes!) I know that 7 years times 12 months doesn't equal 79 editions! The explaination is that there was a 7 month break in the newsletter in 1996. Also the numbers above were just a bit of fun (!) and shouldn't be taken too seriously. They shouldn't be considered as a tracker for active galaxies research.

Abstracts of recently accepted papers

Polarization and kinematics of Cygnus A

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From optical spectropolarimetry of Cygnus A we conclude that the scattering medium in the ionization cones in Cygnus A is moving outward at a speed of $170\pm34\,\mathrm{km\,s^{-1}}$, and that the required momentum can be supplied by the radiation pressure of an average quasar. Such a process could produce a structure resembling the observed ionization cones, which are thought to result from shadowing by a circumnuclear dust torus. We detect a polarized red wing in the [O III] emission lines arising from the central kiloparsec of Cygnus A. This wing is consistent with line emission created close to the boundary of the broad-line region.

Accepted by MNRAS letters

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preprint available at astro-ph/0308412

A high resolution radio study of neutral gas in the starburst galaxy NGC 520

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We present sub-arcsecond angular resolution observations of the neutral gas in the nearby starburst galaxy NGC 520. The central kiloparsec region of NGC 520 contains an area of significantly enhanced star formation. The radio continuum structure of this region resolves into $\sim$ 10 continuum components. By comparing the flux densities of the brightest of these components at 1.4 GHz with published 15 GHz data we infer that these components detected at 1.4 and 1.6 GHz are related to the starburst and are most likely to be collections of several supernova remnants within the beam. None of these components are consistent with emission from an active galactic nuclei (AGN). Both neutral hydrogen (HI) and hydroxyl (OH) absorption lines are observed against the continuum emission, along with a weak OH maser feature probably related to the star formation activity in this galaxy. Strong HI absorption ($N_H \sim 10^{22}\,\mathrm{atoms\,cm^{-2}}$) traces a velocity gradient of $0.5\,\mathrm{km\,s^{-1}\,pc^{-1}}$ across the central kiloparsec of NGC 520. The HI absorption velocity structure is consistent with the velocity gradients observed in both the OH absorption and in CO emission observations (Yun & Hibbard 2001). The neutral gas velocity structure observed within the central kiloparsec of NGC 520 is attributed to a kiloparsec-scale ring or disk. It is also noted that the velocity gradients observed for these neutral gas components appear to differ with the velocity gradients observed from optical ionised emission lines. This apparent disagreement is discussed and attributed to the extinction of the optical emission from the actual centre of this source hence implying that optical ionised emission lines are only detected from regions with signifcantily different radii to those sampled by the observations presented here.

Accepted by MNRAS

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A search for extragalactic H_2O maser emission towards IRAS galaxies II – Discovery of an H_2O maser in the Seyfert 1 galaxy NGC 4051

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Water vapor maser emission in the 6_{16}–5_{23} transition towards the narrow-line Seyfert 1 (NLS1) galaxy NGC 4051 has been discovered during an ongoing single-dish extragalactic water maser survey. The Doppler-shifted maser components appear to symmetrically bracket maser components lying near the systemic velocity of the galaxy. The tentative result of a VLA snapshot observation is that the masers are confined within 0.1 arcsec (5 pc at a distance D = 9.7 Mpc) of the radio continuum peak seen at 8.4 GHz. The low luminosity of the maser ($\sim 2\,L_\odot$) is not typical for masers that coincide with the radio continuum nucleus and appear associated with AGN activity. A low-luminosity maser in a Type 1 Seyfert nucleus could be explained by a low maser gain resulting from the lower inclination of an obscuring disk around an active nucleus.

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Near-infrared spectroscopy of powerful compact steep spectrum radio sources

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We have obtained near-infrared spectroscopy of a small sample of powerful Compact Steep-Spectrum (CSS) radio sources mainly, but not exclusively, from the 3CR sample. We find no differences between the distributions in the equivalent width and luminosity of the [OIII]5007 line for our sample and other larger, presumably older, high-redshift 3C objects, suggesting that the underlying quasar luminosity remains roughly constant as quasars age. We also find a possible broad line in 3C241, adding to recent evidence for broad lines in some radio galaxies.

Accepted by MNRAS

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The Ionized Gas and Nuclear Environment in NGC 3783: IV. Variability and Modeling of the 900 ks *CHANDRA* Spectrum

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We present a detailed spectral analysis of the data obtained from NGC 3783 during the period 2000–2001 using *Chandra*. The data were split in various ways to look for time- and luminosity-dependent spectral variations. This analysis, along with the measured equivalent widths of a large number of X-ray lines and photoionization calculations, lead us to the following results and conclusions. 1) NGC 3783 fluctuated in luminosity by a factor ~ 1.5 during individual observations (most of which were of 170 ks duration). These fluctuations were not associated with significant spectral variations. 2) On a longer time scale (20–120 days), we found the source to exhibit two very different spectral shapes. The main difference between these can be well-described by the appearance (in the "high state") and disappearance (in the "low state") of a spectral component that dominates the underlying continuum at the longest wavelengths. Contrary to the case in other objects, the spectral variations are not related to the brightening or the fading of the continuum at short wavelengths in any simple way. NGC 3783 seems to be the first AGN to show this unusual behavior. 3) The appearance of the soft continuum component is consistent with being *the only* spectral variation, and there is no need to invoke changes in the opacity of the absorbers lying along the line of sight. Indeed, we find all the absorption lines which can be reliably measured have the same equivalent widths (within the observational uncertainties) during high- and low-states. 4) Photoionization modeling indicates that a combination of three ionized absorbers, each split into two kinematic components, can explain the strengths of almost all the absorption lines and bound-free edges. These three components span a large range of ionization, and have total column of about 4×10^{22} cm^{-2}. Moreover, all three components are thermally stable and seem to have the same gas pressure. Thus all three may co-exist in the same volume of space. This is the first detection of such a multi-component, equilibrium gas in an AGN. 5) The only real discrepancy between our model and the observations concerns the range of wavelengths absorbed by the iron M-shell UTA feature. This most likely arises as the result of our underestimation of the poorly-known dielectronic recombination rates appropriate for these ions. We also note a small

discrepancy in the calculated column density of O VI and discuss its possible origin. 6) The lower limit on the distance of the absorbing gas in NGC 3783 is between 0.2 and 3.2 pc, depending on the component of ionized gas considered. The assumption of pressure equilibrium imposes an upper limit of about 25 pc on the distance of the least-ionized component from the central source.

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The Nuclear Region of Low Luminosity Flat Radio Spectrum Sources. I. Stellar Content

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In this work we have examined the spectroscopic properties of a sample of 19 optically bright, low luminosity Flat Radio Spectrum (LL FRS) sources. Our study focuses on the properties of their host galaxies, namely the nuclear stellar populations and dust content. In the optical — spectral region covered by our data — the objects in the sample are mainly dominated by the host galaxy starlight, which strongly dilutes the non-thermal continuum as well as possible emission-line features related to the active nucleus. We have computed the nuclear stellar populations contributing to the spectra of the objects in our sample. The stellar population synthesis has been performed by using a very reliable mathematical method, which yields a Global Principal Geometrical solution. Our results show that, for most of the objects in the sample, the populations are composed of old stars of solar metallicity, or lower; the populations are mainly composed of late-type stars, i.e. G, K and M spectral types, the young component coming thus from supergiant stars; the dust content is weak. Both the stellar populations and the dust content are in agreement with what is usually observed in "normal" elliptical galaxies. Similar stellar content has equally been found in the nuclear regions of galaxies hosting a Low Ionization Nuclear Emission Line Region, or LINER.

The present work is important in illustrating the different applications of stellar population synthesis in the study of low luminosity radio sources. In fact, the synthesis allows us not only to obtain valuable information about the stellar populations and dust content of the host galaxies, therefore providing material for further studies on the connection between host galaxy and active nucleus, but also to reveal the so-far unstudied optical emission-line features present in the spectrum of our objects.

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preprint available at http://xxx.lanl.gov/astro-ph/0309534

The Nuclear Region of Low Luminosity Flat Radio Spectrum Sources. II. Emission-Line Spectra

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We report on the spectroscopic study of 19 low luminosity Flat Radio Spectrum (LL FRS) sources selected from Marchã's et al. (1996) 200 mJy sample. In the optical, these objects are mainly dominated by the host galaxy starlight. After correcting the data for this effect, we obtain a new set of spectra clearly displaying weak emission lines; analysis. such features carry valuable information concerning the excitation mechanisms at work in the nuclear regions of LL FRS sources. We have used a special routine to model the spectra and assess the intensities and velocities of the emission lines; we have analyzed the results in terms of diagnostic diagrams. Our analysis shows that 79% of the studied objects harbour a Low Ionization Nuclear Emission-line Region (or LINER) whose contribution was swamped by the host galaxy starlight. The remaining objects display a higher ionization spectrum, more typical of Seyferts; due to the poor quality of the spectra, it was not possible to identify any possible large Balmer components. The fact that we observe a LINER-type spectrum in LL FRS sources supports the idea that some of these objects could be undergoing an ADAF phase; in addition, such a low ionization emission-line spectrum is in agreement with the black hole mass values and sub-Eddington accretion rates published for some FRS sources.

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Early Growth and Efficient Accretion of Massive Black Holes at High Redshift

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Black-hole masses of the highest redshift quasars ($4 \lesssim z \lesssim 6$) are estimated using a previously presented scaling relationship, derived from reverberation mapping of nearby quasars, and compared to quasars at lower redshift. It is shown that the central black holes in luminous $z \gtrsim 4$ quasars are very massive ($\gtrsim 10^9 M_\odot$). It is argued that the mass estimates of the high-z quasars are not subject to larger uncertainties than those for nearby quasars. Specifically, the large masses are not overestimates and the lack of similarly large black-hole masses in the nearby Universe does not rule out their existence at high-z. However, AGN host galaxies do not typically appear fully formed and/or evolved at these early epochs. This supports scenarios in which black holes build up mass very fast in a radiatively inefficient (or obscured) phase relative to the stars in their galaxies. Additionally, upper envelopes of $M_{\rm BH} \approx 10^{10} M_\odot$ and $L_{\rm bol} \approx 10^{48}$ ergs s^{-1} are observed at all redshifts.

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preprint available at http://arxiv.org/abs/astro-ph/0309521

Occurrence and Global Properties of Narrow C IV λ1549Å Absorption Lines in Moderate-Redshift Quasars

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A statistical study is presented of (a) the frequency of narrow C IV λ 1549 absorption lines in $1.5 \lesssim z \lesssim 3.6$ radio-quiet and radio-loud quasars, and of (b) the UV and radio properties of the absorbed quasars. The quasar sample is unbiased with respect to absorption properties and the radio-quiet and radio-loud subsamples are well matched in redshift and luminosity. A similarly high incidence ($\gtrsim$50%) of narrow C IV absorbers is detected for the radio-quiet and radio-loud quasars, and a constant ~25% of all the quasars, irrespective of radio type display *associated* C IV absorbers stronger than $EW_{\rm rest} \geq 0.5$Å. Both radio-quiet and radio-loud quasars with narrow absorption lines have systematically redder continua, especially strongly absorbed objects. There is evidence of inclination dependent dust reddening and absorption for the radio quasars. An additional key result is that the most strongly absorbed radio quasars have the largest radio source extent. This result is in stark contrast to a recent study of the low-frequency selected Molonglo survey in which a connection between the strength of the narrow absorbers and the (young) age of the radio source has been proposed. The possible origin of these discrepant results is discussed and may be related to the higher source luminosity for the quasars studied here.

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Parsec-Scale Radio Structure of the Double Active Nucleus of NGC 6240

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NGC 6240 is a luminous infrared galaxy that, based on recent MERLIN and CHANDRA observations, appears to host a pair of active galactic nuclei. We present new, multiepoch and multifrequency radio observations of NGC 6240 obtained using the Very Long Baseline Array (VLBA). These observations resolve out all of the diffuse radio continuum emission related to starburst activity to reveal three compact sources, two associated with the infrared and X-ray nuclei: components N1, the northern nucleus, and S, the southern nucleus; and component S1, a weak point source lying northeast of component S. The radio continuum properties of N1 and S both resemble those of compact radio sources in Seyfert nuclei, including an inverted spectrum at low frequencies and high brightness temperatures. Component N1 further resolves into a 9 pc linear source, again resembling compact jets in some well-studied Seyfert nuclei. The inverted radio spectrum is most likely caused by free-free absorption through foreground plasma with emission measures of order 10^7 cm^{-6} pc, consistent with the X-ray spectroscopy which infers the presence of a foreground, Compton thick absorber. Synchrotron self-absorption may also contribute to the flat spectrum of component S. Component S1 better resembles a luminous radio supernova such as those detected in Arp 220,

although we cannot specifically rule out the possibility that S1 may be ejected material from the southern active nucleus. We demonstrate that the light curve of S1 is at least consistent with current radio supernova models, and, given the high star-formation rate in the nuclear region and the (possible) proclivity of infrared merger galaxies to produce luminous RSNe, it is not surprising that one such supernova is detected serendipitously in the VLBA observations.

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Multiepoch Sky Surveys and the Lifetime of Quasars

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We present a new method to measure the episodic lifetime of quasars with current and future large-scale sky surveys. Future photometric observations of large samples of confirmed quasars can provide a direct measurement (or interesting lower limit) to the lifetime of an individual episode of quasar activity (t_Q) and potentially enable the study of post-quasar host galaxies. Photometric observations of the quasars found by the Sloan Digital Sky Survey (SDSS) and 2dF Survey could, with a time baseline of ten years, determine t_Q to within a factor of two if $t_Q < 10^5$ years, or set a lower limit to the quasar lifetime. Multiple-epoch, precise photometry with the proposed *Large Synoptic Survey Telescope* could test more complex models for quasar variability and mean quasar luminosity evolution. These observations could also constrain the rate that tidal disruptions of single stars produce quasar luminosities.

It is possible to reverse the order of this investigation; previous-epoch plate material, such as the Digitized Sky Survey, can be used to determine if any of the SDSS quasars had not yet turned on at the time of these prior observations. Measurements of the entire SDSS quasar sample over the ~ 50 year baseline provided by these plates can potentially be used to estimate t_Q to within a factor of two if $t_Q < 10^{5.5}$ years, provided quasar variability can be accurately characterized and the detection efficiency and photometric calibration of the plate material can be well determined. These measurements of t_Q will have comparable quality to existing, more indirect estimates of the quasar lifetime. Analysis of the 3814 quasars in the SDSS Early Data Release finds that t_Q must be larger than approximately 20,000 years.

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preprint available at http://xxx.lanl.gov/abs/astro-ph/0309650

Physical interpretation of the UV/X-ray variability behavior of NGC 7469

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We present a re-analysis of the simultaneous ~ 30 day IUE/XTE observation of NGC 7469 done in 1996. Our main progress in this paper, in comparison to previous spectral analysis (Nandra et al. 1998, 2000), is to adopt and fit directly to the data a detailed model of the Comptonized spectrum. This firstly allows to fit simultaneously the data from the UV to the hard X-ray band in a self-consistent way and secondly it gives direct constraints on the physical parameters of the disc-corona system, like the temperature and optical depth of the corona.
Our results are completely consistent with a slab geometry where all the observed UV emission is supposed to cross the corona but more photon-starved geometries also give acceptable fits. Whatever the geometry is, the UV seed photon emission appears to be dominated by the reprocessing of the X-rays. We also found very interesting correlations between the different model parameters, the most important one being the anticorrelation between the corona temperature kT_e and the UV flux F_{UV}. Such an anticorrelation is clearly inconsistent with a fixed disc-corona configuration and suggests a variation of the geometry of the system. We also find a correlation between the corona optical depth and the X-ray flux which may reflect processes linked to the corona formation. During the observations, NGC 7469 appears to accrete near its Eddington limit. This source could then be an example of magnetically dominated disc-corona system as recently proposed by Merloni (2003). Finally, these data strongly support the presence of a pair free corona.

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preprint available at astro-ph/0309718

Kinematically quiet halos around $z \sim 2.5$ radio galaxies. Keck spectroscopy

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We present the results of the kinematic study of the extended gas in a sample of 10 high redshift radio galaxies ($z \sim 2.5$) based on high signal to noise Keck II and VLT long slit spectroscopy. In addition to the typical high surface brightness kinematically perturbed regions (FWHM and velocity shifts $>$1000 km s^{-1}), we find in all objects giant low surface brightness halos which show quieter kinematics with typical emission line FWHM and velocity shifts of $\sim$several hundred km s^{-1}.

The giant halos often extend for more than 100 kpc and sometimes beyond the radio structures. They emit lines other than Lyα (CIV, HeII and NV in some cases), typically found in the spectra of high redshift active galaxies. Continuum is also often detected. The halos are enriched with heavy elements at tens of kpc from the active nucleus. Typical Lyα luminosities and surface brightness (within the slit) are in the range 10^{43-44} erg s^{-1} and several $\times$ $10^{-17\ to\ -16}$ erg cm^{-2} s^{-1} arcsec^{-2} respectively. Estimated densities are in the range $\sim$17-150 cm^{-3}. The quasar continuum is the dominant source of ionization of the quiescent halos along the radio axis. The implied total quasar ionizing luminosities are in the range $\sim$several $\times$ 10^{45}-10^{47} erg s^{-1}, in the same range as radio loud quasars at comparable redshift.

The detection of giant quiescent halos in all objects suggests that they could be a common ingredient of high redshift radio galaxies. The radio galaxies seem to be embedded within the halos. The nature, origin of the halos and the cosmological implications are also discussed.

Accepted for publication in MNRAS

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paper available at http://babbage.sissa.it/abs/astro-ph/0309012

Meetings

I A U Symposium No. 222 - BHSIGN Conference: The Interplay among Black Holes, Stars and ISM in Galactic Nuclei

Gramado, Brasil

March 1-5, 2004

Second Announcement - Call for Papers

We invite you to visit our new homepage: **http://bhsign.if.ufrgs.br/** through which you can register submitting your contribution **BEFORE THE DEADLINE OF NOVEMBER 15.**

We announce the opportunity of IAU grants, about which you can learn at the homepage above. For your convenience, we have also included information about hotels, the cities of Gramado and Porto Alegre, social events and possible tours.

Based on the submitted contributions, the SOC will decide on the final program which will be advertised through a third announcement by November 30. We will then ask for hotel reservations and payment of the registration fee of US$170,00 (which will include the Proceedings, Conference Dinner, conference materials and services).

You should find all the information you need in the above homepage, but, if necessary, you may contact us using the e-mail address **bhsign@if.ufrgs.br**.

Thaisa Storchi Bergmann (Chair of the SOC)

Jobs

Postdoctoral Fellowship - AGN Jet Physics

Joint Center for Astrophysics, University of Maryland, Baltimore County, USA
Application deadline: December 31, 2003

The Joint Center for Astrophysics at the University of Maryland, Baltimore County, invites applications for a Postdoctoral Fellow position beginning in 2004. The successful applicant will work with Dr. Eric Perlman and collaborators on multi-waveband observations of AGN jets. Research work will include the reduction of data from the HST, Chandra, and the VLA, modeling of jet physics, as well as preparation of observing proposals and the implementation of observing programs.

The candidate should have experience with X-ray, optical and/or astronomical data analysis methods and analysis packages (e.g.,IRAF/PyRAF, FTOOLS, CIAO, XSPEC, AIPS), and should be proficient in scientific programming. The position requires a Ph.D. in Astronomy, Physics or a closely related field. The initial appointment will be for one year, with renewal for up to two more years possible subject to funding.

For full consideration completed applications should be received before **December 31, 2003**, although applications will be reviewed until the position is filled. Applicants should submit their CV, bibliography, statement of research interests, and the names and contact information for three references to:

Joint Center for Astrophysics
Physics Department
University of Maryland, Baltimore County
1000 Hilltop Circle
Baltimore, MD 21250
USA

Inquiries should be addressed to Dr. Eric Perlman at perlman@jca.umbc.edu or 410-455-1982. Information about the Joint Center for Astrophysics, a collaboration between UMBC and NASA's Goddard Space Flight Center, can be found at http://jca.umbc.edu. UMBC is an AA/EOE.

Note from editor:

Considering the closing date for this post, this advert will be run in the October, November & December issues of the newsletter (RJB).

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.