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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

A Strong Correlation between Circumnuclear Dust and Black Hole Accretion in Early-Type Galaxies

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We present a detailed investigation of the incidence of circumnuclear dust structure in a large, well-matched sample of early-type galaxies with and without Active Galactic Nuclei (AGN). All 34 early-type AGN hosts in our sample have circumnuclear dust, while dust is only observed in 26% (nine) of a pair-matched sample of 34 early-type, inactive galaxies. This result demonstrates a strong correlation between the presence of circumnuclear dust and accretion onto the central, supermassive black hole in elliptical and lenticular galaxies. This correlation is not present at later Hubble types, where a sample of 31 active and 31 inactive galaxies all contain circumnuclear dust. These archival, *Hubble Space Telescope* observations reveal a wide range of mostly chaotic dust morphologies. Current estimates suggest the dust settling or destruction time is on order of 10^8 years and therefore the presence of dust in $\sim 50\%$ of early-type galaxies requires frequent replenishment and similarly frequent fueling of their central, supermassive black holes. The observed dust could be internally-produced (via stellar winds) or externally-accreted, although there are observational challenges for both of these scenarios. Our analysis also reveals that approximately a third of the early-type galaxies without circumnuclear dust have nuclear stellar disks. These nuclear stellar disks may provide a preferred kinematic axis to externally-accreted material and this material may in turn form new stars in these disks. The observed incidence of nuclear stellar disks and circumnuclear dust suggests that episodic replenishment of nuclear stellar disks occurs and is approximately concurrent with the fueling of the central AGN.

Accepted by the Astrophysical Journal

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preprint available at http://arxiv.org/abs/astro-ph/0610380

Deep ATLAS radio observations of the CDFS-SWIRE field

Ray P. Norris[1], Jos Afonso[5], Phil N. Appleton[2], Brian J. Boyle[1], Paolo Ciliegi[6], Scott M. Croom[4], Minh T. Huynh[2], Carole A. Jackson[1], Anton M. Koekemoer[7], Carol J. Lonsdale[3], Enno Middelberg[1], Bahram Mobasher[7], Seb J. Oliver[8], Mari Polletta[3], Brian D. Siana[2], Ian Smail[9], and Maxim A. Voronkov[1]

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We present the first results from the Australia Telescope Large Area Survey (ATLAS), which consist of deep radio observations of a 3.7 square degree field surrounding the Chandra Deep Field South, largely coincident with the infrared Spitzer Wide-Area Extragalactic (SWIRE) Survey. We also list cross-identifications to infrared and optical photometry data from SWIRE, and ground-based optical spectroscopy. A total of 784 radio components are identified, corresponding to 726 distinct radio sources, nearly all of which are identified with SWIRE sources. Of the radio sources with measured redshifts, most lie in the redshift range 0.5-2, and include both star-forming galaxies and active galactic nuclei (AGN). We identify a rare population of infrared-faint radio sources which are bright at radio wavelengths but are not seen in the available optical, infrared, or X-ray data. Such rare classes of sources can only be discovered in wide, deep surveys such as this.

Accepted by Astron. J.

E-mail contact: ray.norris@csiro.au,
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Fermi acceleration in astrophysical jets

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We consider the acceleration of energetic particles by Fermi processes (i.e., diffusive shock acceleration, second order Fermi acceleration, and gradual shear acceleration) in relativistic astrophysical jets, with particular attention given to recent progress in the field of viscous shear acceleration. We analyze the associated acceleration timescales and the resulting particle distributions, and discuss the relevance of these processes for the acceleration of charged particles in the jets of AGN, GRBs and microquasars, showing that multi-component powerlaw-type particle distributions are likely to occur.

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preprint available at http://xxx.lanl.gov/abs/astro-ph/0610141

A microscopic analysis of shear acceleration

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A microscopic analysis of the viscous energy gain of energetic particles in (gradual) nonrelativistic shear flows is presented. We extend previous work and derive the Fokker-Planck coefficients for the average rate of momentum change and dispersion in the general case of a momentum-dependent scattering time $\tau(p) \propto p^{\alpha}$ with $\alpha \geq 0$. We show that in contrast to diffusive shock acceleration, the characteristic shear acceleration timescale depends inversely on the particle mean free path, which makes the mechanism particularly attractive for high energy seed particles. Based on an analysis of the associated Fokker-Planck equation, we show that above the injection momentum p_0 power-law differential particle number density spectra $n(p) \propto p^{-(1+\alpha)}$ are generated for $\alpha > 0$ if radiative energy losses are negligible. We discuss the modifications introduced by synchrotron losses and determine the contribution of the accelerated particles to the viscosity of the background flow. Possible implications for

the plasma composition in mildly relativistic extragalactic jet sources (WATs) are addressed.

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Large-Scale Parker Winds in Active Galactic Nuclei

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We build and test Parker-wind models to apply to observations of large-scale ($\sim$ 100pc) outflows from Active Galactic Nuclei (AGNs). These models include detailed photoionization simulations, the observed radially varying mass profile, adiabatic cooling, and approximations for clouds dragged along in the wind and the interaction of the wind with the circumnuclear ISM of the galaxy. We test this model against recent *HST*/STIS observations of [O III] emission-line kinematics (in particular, we test against those observed in NGC 4151, but approximately the same kinematics is observed in NGC 1068 and Mrk 3) to constrain the viability of large-scale thermal winds in AGNs. We find that adiabatic cooling dominates in these outflows, decelerating Parker winds on large scales, making them highly unlikely as explanations of the observed kinematics.

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E-mail contact: everett@physics.wisc.edu, preprint available at http://arxiv.org/abs/astro-ph/0610757

The Survey of Nearby Nuclei with STIS (SUNNS):Emission- Line Nuclei at Hubble Space Telescope Resolution

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We present results from a program of optical spectroscopy for 23 nearby galaxy emission-line nuclei. This investigation takes advantage of the spatial resolution of the Hubble Space Telescope to study the structure and energetics of the central 10 - 20 pc, and the resulting data have value for quantifying central black hole masses, star formation histories, and nebular properties. This paper provides a description of the experimental design, and new findings from the study of emission lines. The sample targets span a range of nebular spectroscopic class, from HII to Seyfert nuclei. The line ratios indicative of nebular ionization show only modest variations over order-of-magnitude differences in radius, and demonstrate in a systematic way that geometrical dilution of the radiation field from a central source cannot be assumed as a primary driver of ionization structure. Comparisons between large- and small-aperture measurements for the HII/LINER transition objects provide a new test that challenges conventional wisdom concerning the composite nature of these systems. We also list a number of other quantitative results that are of interest for understanding galaxy nuclei, including (1) the spatial distribution/degree of concentration of H-alpha emission as a function of nebular type; (2) the radial variation in electron density as a function of nebular type; and (3) quantitative broad H- alpha estimates obtained at a second epoch for these low-luminosity nuclei. The resulting measurements provide a new basis for comparing the nuclei of other galaxies with that of the Milky Way. We find that the Galactic Center is representative across a wide span of properties as a low-luminosity emission-line nucleus.

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E-mail contact: shields@phy.ohiou.edu, preprint available at http://arxiv.org/abs/astro-ph/0410321

Detailed Structure of the X-ray Jet in 4C 19.44 (=PKS1354+195)

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We investigate the variations of the magnetic field, Doppler factor, and relativistic particle density along the jet of a quasar at z=0.72. We chose 4C 19.44 for this study because of its length and straight morphology. The 18 arcsec length of the jet provides many independent resolution elements in the Chandra X-ray image. The straightness suggests that geometry factors, although uncertain, are almost constant along the jet. We assume the X-ray emission is from inverse Compton scattering of the cosmic microwave background. With the aid of assumptions about jet alignment, equipartition between magnetic-field and relativistic-particle energy, and filling factors, we find that the jet is in bulk relativistic motion with a Doppler factor ≈ 6 at an angle no more than 10° to the line of sight over deprojected distances $\approx$ 150–600 kpc from the quasar, and with a magnetic field $\approx$10 μGauss.

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E-mail contact:das@head.cfa.harvard.edu,
preprint available at http://xxx.lanl.gov/abs/astro-ph/0610755

Outflows of very ionized gas in the center of Seyfert galaxies: kinematics and physical conditions

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Mid-resolution spectra are used to deduce the size and kinematics of the coronal region in a sample of Seyfert galaxies by means of observations of the [Fe XI], [Fe X], [Fe VII], [Si VI] and [Si VII] lines. These coronal lines (CL) extend from the unresolved nucleus up to a few tens to a few hundreds of parsecs. The region of the highest ionized ions studied, [Fe XI] and [Fe X], is the least spatially extended, and concentrates at the center; intermediate ionization lines extend from the nucleus up to a few tens to a few hundred parsecs; lower [O III]-like ions are known to extend to the kpc range. All together indicates a stratification in the ionized gas, usually interpreted in terms of nuclear photoionization as the driving ionization mechanism. However, CL profiles show various peculiarities: they are broader by a factor of two than lower ionization lines, the broadening being in terms of asymmetric blue wings, and their centroid position at the nucleus is blueshifted by a few hundreds of km s^{-1}. Moreover, in NGC 1386 and NGC 1068, a double-peak [Fe VII] line is detected in the nuclear and extended coronal region, this being the first report in of such type of profile in CL in active galactic nuclei. If interpreted as outflow signatures, the total broadening of the lines at zero intensity levels implies gas velocities up to 2000 km s^{-1}. Although the stratification of ions across the coronal region means that photoionization is the main power mechanism, the high velocities deduced from the profiles, the relatively large spatial extension of the emission, and the results from photoionization models indicate that an additional mechanism is at work. We suggest that shocks generated by the outflow could provide the additional required power for line formation.

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E-mail contact: aardila@lna.br,
preprint available at http://arxiv.org/abs/astro-ph/0609635

Mid-Infrared Diagnostics of LINERs

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We report results from the first mid-infrared spectroscopic study of a comprehensive sample of 33 LINERs, observed with the Spitzer Space Telescope. We compare the properties of two different LINER populations: infrared-faint LINERs, with LINER emission arising mostly in compact nuclear regions, and infrared-luminous LINERs, which often show spatially extended (non-AGN) LINER emission. We show that these two populations can be easily distinguished by their mid-infrared spectra in three different ways: (i) their mid-IR spectral energy distributions (SEDs), (ii) the emission features of polycyclic aromatic hydrocarbons (PAHs), and (iii) various combinations of IR fine-structure line ratios. IR-luminous LINERs show mid-IR SEDs typical of starburst galaxies, while the mid-IR SEDs of IR-faint LINERs are much bluer. PAH flux ratios are significantly different in the two groups. Fine structure emission lines from highly excited gas, such as [O IV], are detected in both populations, suggesting the presence of an additional AGN also in a large fraction of IR-bright LINERs, which contributes little to the combined mid-IR light. The two LINER groups occupy different regions of mid-infrared emission-line excitation diagrams. The positions of the various LINER types in our diagnostic diagrams provide important clues regarding the power source of each LINER type. Most of these mid-infrared diagnostics can be applied at low spectral resolution, making AGN- and starburst-excited LINERs distinguishable also at high redshifts.

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E-mail contact: sturm@mpe.mpg.de,
preprint available at http://www.arxiv.org/abs/astro-ph/0610772

Meetings

First Announcement:
The Nuclear Region, Host Galaxy and Environment of Active Galaxies: A Symposium to celebrate the 60th birthday of Deborah Dultzin-Hacyan
Huatulco, Mexico
18 – 20 April 2007

Webpage: `http://www.astroscu.unam.mx/congresos/agn2007/`

This is the FIRST announcement of the Symposium: "The Nuclear Region, Host Galaxy and Environment of Active Galaxies: A Symposium to celebrate the 60th birthday of Deborah Dultzin-Hacyan" organized by the Instituto de Astronomia (UNAM), to be held on April 18 to 20, 2007 in Huatulco, Mexico.

Huatulco, a beautiful beach town at the Pacific Ocean. The hotel hosting the meeting is still not confirmed, . We are still negotiating for the best deal in terms of facilities for the conference, price and meals. The organizers will inform soon on the final selection.

The registration fee is $250 (US Dlls.) that will cover the publication of the proceedings book and conference costs.

The meeting will cover topics ranging from the nearest environment of the black hole, to the environment of the host galaxies of AGN.

SOC: Virginia Trimble (USA), Iraida Pronik (Crimea), Catherine Boisson (France), Elena Terlevich (UK, Mexico), Josefa Masegosa (Spain), Irene Cruz-Gonzalez (Mexico), Elena Pian (Italy), Sueli Viegas (Brazil), Dawei Xu (China), Erika Benitez (chair, Mexico)

LOC: Erika Benitez (chair, Mexico), Irene Cruz-Gonzalez, Yair Krongold, Hector Hernandez-Toledo, Raul Mujica, Vahram Chavushyan, Alfredo Diaz, Alenka Negrete, Mercedes Andrade.

Invited Talks (confirmed):

- Suzy Collin
- Jack Sulentic
- Vahe Petrosian
- Megan Urry
- Thaisa Strochi-Bergmann
- Martin C. Gaskell
- Isabel Marquez
- Paola Marziani
- Manolis Plionis
- Stefanie Komossa
- Luc Binette
- Esko Valtaoja
- Roberto Cid-Fernandez

For more information you can visit the conference website:
`http://www.astroscu.unam.mx/congresos/agn2007/`

Please forward this announcement any interested colleagues.

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