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

Peering through the dust: Evidence for a supermassive Black Hole at the nucleus of Centaurus A from VLT IR spectroscopy

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We used the near infrared spectrometer ISAAC at the ESO *Very Large Telescope* to map the velocity field of Centaurus A (NGC 5128) at several position angles and locations in the central 20" of the galaxy. The high spatial resolution ($\sim$ 0.5") velocity fields from both ionized and molecular gas (Paβ, [FeII], Brγ and H_2) are not compromised by either excitation effects or obscuration. We identify three distinct kinematical systems: (i) a rotating "nuclear disk" of ionized gas, confined to the inner 2", the counterpart of the Paα feature previously revealed by HST/NICMOS imaging; (ii) a ring-like system with a $\sim$ 6" inner radius detected only in H_2, likely the counterpart of the 100pc-scale structure detected in CO by other authors; (iii) a normal extended component of gas rotating in the galactic potential. The nuclear disk is in keplerian rotation around a central mass concentration, dark ($M/L > 20$ $M_\odot/L_{K\odot}$) and point-like at the spatial resolution of the data ($R < 0.25" \sim 4$pc). We interpret this mass concentration as a supermassive black hole. Its dynamical mass based on the line velocities and disk inclination ($i > 15°$) is $M_\bullet = 2^{+3.0}_{-1.4} \times 10^8 M_\odot$. The ring-like system is probably characterized by non-circular motions; a "figure-of-8" pattern observed in the H_2 position-velocity diagram might provide kinematical evidence for the presence of a nuclear bar.

Accepted by the Astrophysical Journal

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Evidence for Rapid Iron K_α Line Flux Variability in MCG–6-30-15

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This paper employs direct spectral fitting of individual orbital data in order to measure rapid X-ray iron K_α line and continuum spectral slope variations in Seyfert 1 galaxies with unprecedented temporal resolution. Application of this technique to a long *xte* observation of MCG–6-30-15 indicates that the line flux does vary on short (<1 d) timescales, but that these variations are *not* correlated with changes in the continuum flux or slope. These rapid variations indicate that the line does indeed originate close to the black hole, confirming predictions based on its very broad profile. However, the lack of a correlation with the continuum presents problems for models in which the line variations are driven by those in the continuum, modified only by light-traveltime effects. Instead, it may be that the line responds according to a physical process with a different time scale, such as ionization instabilities in the disk, or perhaps that the geometry and physical picture is more complex than implied by the simplest disk–corona models.

These data also indicate that the slope of the underlying power-law continuum (Γ) shows strong variability and is tightly correlated with thecontinuum flux in the sense that the spectrum steepens as the source brightens.All of these results have been checked with extensive simulations, which also indicated that a spurious correlation between Γ and Compton reflection fraction (R) will result if these quantities are measured from the same spectra. This casts serious doubts on previous claims of such a $\Gamma - R$ correlation.

Accepted by Ap.J.

E-mail contact: sav@ast.cam.ac.uk (new address),
preprint available at http://ledas-www.star.le.ac.uk/Preprint/

Chandra Observations of Cygnus A: Magnetic Field Strengths in the Hot Spots of a Radio Galaxy

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We report X-ray observations of the powerful radio galaxy Cygnus A with the Chandra X-ray Observatory. This letter focuses on the radio hot spots, all four of which are detected in X-rays with a very similar morphology to their radio structure. X-ray spectra have been obtained for the two brighter hot spots (A and D). Both are well described by a power law with photon index $\Gamma = 1.8 \pm 0.2$ absorbed by the Galactic column in the direction of Cygnus A. Thermal X-ray models require too high gas densities and may be ruled out. The images and spectra strongly support synchrotron self-Compton models of the X-ray emission, as proposed by Harris, Carilli & Perley on the basis of ROSAT imaging observations. Such models indicate that the magnetic field in each of the brighter hot spots is 1.5×10^{-4} gauss, with an uncertainty of a few tens of percent. This value is close to the equipartition field strengths assuming no protons are present. The possibility that the X-rays are synchrotron radiation is briefly discussed, but not favored. We speculate that production of the $\gamma \sim 10^7$ electrons necessary for X-ray synchrotron radiation from hot spots is inhibited when the external gas density is high, as is the case when the radio galaxy is within a cooling flow.

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Chandra Observations of the X-ray Narrow-Line Region in NGC 4151

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We present the first high-resolution X-ray spectrum of the Seyfert 1.5 galaxy NGC 4151. Observations with the Chandra High Energy Transmission Grating Spectrometer reveal a spectrum dominated by narrow emission lines from a spatially resolved (1.6 kpc), highly ionized nebula. The X-ray narrow-line region is composite, consisting of both photoionized and collisionally ionized components. The X-ray emission lines have similar velocities, widths, and spatial extent to the optical emission lines, showing that they arise in the same region. The clouds in the narrow-line region must contain a large range of ionization states in order to explain both the optical and X-ray photoionized emission. Chandra data give the first direct evidence of X-ray line emission from a hot plasma ($T \sim 10^7$ K) which may provide pressure confinement for the cooler ($T = 3 \times 10^4$ K) photoionized clouds.

Accepted by ApJ Letters.

E-mail contact: pmo@space.mit.edu,
preprint available at http://xxx.lanl.gov/abs/astro-ph/0010314

On the viewing angle to broad-lined radio galaxies

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We address the nature of broad-lined radio galaxies, in particular their radio axis orientation, using new, matched resolution, dual frequency radio observations of a sample of twelve nearby broad-lined extragalactic 3C objects. Radio spectral index and depolarisation asymmetries indicate that these objects have a preferred orientation with respect to the observer. In addition, the spectral asymmetries are suggestive of lower Doppler factors in the broad-lined radio galaxies when compared to 3C quasars. This is in agreement with their optical properties, and leads to the conclusion that some objects are lower powered versions—at similar lines of sight—of the more distant quasars, whereas others are at larger angles to the line of sight.

Accepted by A & A.

BeppoSAX observations of Narrow-Line Seyfert 1 galaxies: II. Ionized iron features in Arakelian 564

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The BeppoSAX observations of the bright Narrow–Line Seyfert 1 galaxy Ark 564 are presented along with a high quality optical spectrum taken at the 1.5m telescope at La Silla. The 0.1–10 keV X–ray spectrum is characterized by a strong soft component which is best described by blackbody–like emission with a temperature of ~ 160 eV. At higher energies a steep ($\Gamma \simeq 2.4$) power–law tail is present. There is evidence of an ionized reflector in the form of an iron line and edge. We do not find significant evidence of soft X–ray features if the spectrum is modelled with a two component continuum. The optical and X–ray spectral properties support the hypothesis of a high accretion rate onto a low mass black hole.

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E-mail contact: comastri@bo.astro.it,
preprint available as astro-ph/0010476

1E 0117.2-2837 and the NLR of Narrow-line Seyfert 1 galaxies

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Based on photoionization calculations we present a study of the NLR emission line ratios of Narrow-line Seyfert 1 (NLSy1) galaxies. In particular, we investigate the influence of different EUV - soft-X-ray spectral shapes (a giant soft excess, a steep X-ray powerlaw, presence of a warm absorber) and NLR cloud properties (density, abundances, distance from the continuum source) on the predicted optical emission-line ratios like [OIII] and [FeXIV].

to appear in *Observational and theoretical progress in the study of Narrow-line Seyfert 1 galaxies*, New Astronomy Reviews, in press

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Preprint and related papers are available at http://www.xray.mpe.mpg.de/∼skomossa/

Jet Cocoons in Rotating Seyfert Galaxies: adaptive 3D hydrodynamics

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The narrow-line regions of some Seyfert galaxies show evidence for nuclear jets interacting with the rotating interstellar gas, this is shown by point-symmetric emission-line structures in, for example, Mkn 573 and NGC 3393. We study this situation with numerical simulations of a jet in a sidewind of uniform density but linearly increasing velocity as one moves from the source. We use a new three-dimensional hydrodynam ic code on a binary adaptive grid. We consider two different models, one with a cocoon expansion speed higher and one with expansion speed lower than the ISM speed. We find that the model with high cocoon expansion speed is similar to results from previous calculations without a sidewind, except for minor asymmetries. However, model B with the slow expansion speed and fast wind speed shows considerable qualitative differences. The jet hits and bounces off the dense cooling envelope which is dragged by the sidewind into the straight path of the jet. The path of the jet within the cocoon is straight as long as the extended hot cocoon acts as a shield. Once the jet hits the cold envelope of the cocoon it is bent directly by the ram pressure of the ambient medium and follows a parabola of the third degree which we derive as an analytical approximation for the path. The region where the jet hits the envelope is the start of strong radio emission. This point moves towards the source with age of the jet and its bending angle. We therefore find a possible observable correlation between the distance of the first strong radio knot and the overall bending of jets in Seyfert galaxies. A comparison of our results with observations of Mkn 573 shows that the essential structural and spectral features can be reproduced by choosing an appropriate viewing angle and evolutionary stage. Looking approximately along the original jet direction a structure is found which strongly resembles an ionization cone. Hence caution should prevail when interpreting these sorts of structure within the narrow-line region of Seyfert galaxies.

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preprint available at http://hiperspace.phys.ucl.ac.uk

An XMM-Newton detection of the z = 5.80 X-ray weak quasar SDSSp J104433.04-012502.2

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We report on an *XMM-Newton* observation of the most distant known quasar, SDSSp J104433.04-012502.2, at z = 5.80. We have detected this quasar with high significance in the rest-frame 3.4–13.6 keV band, making it the most distant cosmic object detected in X-rays; 32±9 counts were collected. SDSSp J104433.04-012502.2 is notably X-ray weak relative to other luminous, optically selected quasars, with $\alpha_{\rm ox} = -1.91 \pm 0.05$ and a 3.4–13.6 keV luminosity of $\approx 1.8 \times 10^{44}$ erg s^{-1}. The most likely reason for its X-ray weakness is heavy absorption with $N_{\rm H} \geq 10^{24}$ cm^{-2}, as is seen in some Broad absorption Line quasars and related objects; we discuss this and other possibilities. High-quality spectroscopy from 0.95–1.10 μm to search for blueshifted

C IV absorption may elucidate the origin of the X-ray weakness.

Accepted by Astronomical Journal

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preprint available at http://xxx.lanl.gov/abs/astro-ph/0010328, or
http://www.astro.psu.edu./users/niel/sdss1044m0125/sdss1044m0125.html

The Formation of Broad Line Clouds in the Accretion Shocks of Active Galactic Nuclei

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Recent work on the gas dynamics in the Galactic Center has improved our understanding of the accretion processes in galactic nuclei, particularly with regard to properties such as the specific angular momentum distribution, density, and temperature of the inflowing plasma. With the appropriate extrapolation of the physical conditions, this information can be valuable in trying to determine the origin of the Broad Line Region (BLR) in Active Galactic Nuclei (AGNs). In this paper, we explore various scenarios for the cloud formation based on the underlying principle that the source of plasma is ultimately that portion of the gas trapped by the central black hole from the interstellar medium. Based on what we know about the Galactic Center, it is likely that in highly dynamic environments such as this, the supply of matter is due mostly to stellar winds from the central cluster.

Winds accreting onto a central black hole are subjected to several disturbances capable of producing shocks, including a Bondi-Hoyle flow, stellar wind-wind collisions, and turbulence. Shocked gas is initially compressed and heated out of thermal equilibrium with the ambient radiation field; a cooling instability sets in as the gas is cooled via inverse-Compton and bremsstrahlung processes. If the cooling time is less than the dynamical flow time through the shock region, the gas may clump to form the clouds responsible for broad line emission seen in many AGN spectra. Clouds produced by this process display the correct range of densities and velocity fields seen in broad emission lines. Very importantly, the cloud distribution agrees with the results of reverberation studies, in which it is seen that the central line peak (due to infalling gas at large radii) responds slower to continuum changes than the line wings, which originate in the faster moving, circularized clouds at smaller radii. Finally, we provide an example of fitting an observed line profile using the parameters specified by our model.

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Meetings

“Mass Outflow in Active Galactic Nuclei: New Perspectives”

The Catholic University of America; Washington, DC
March 8 - 10, 2001 (Thurs., Fri., Sat.)

Note: This announcement was inadvertently omitted from last month's Newsletter. Therefore, the deadline for pre-registration has been extended to 20 November 2000.

SCIENTIFIC TOPICS:
Intrinsic UV and X-ray Absorption
Broad Absorption-Line Quasars
Mass Outflow in the Narrow Emission-Line Region
Connection to the Central Engine, Broad-Line Region, and Radio Jets
Photoionization and Shock Models of the Emission and Absorption Regions
Kinematic and Dynamical Outflow Models

New and exciting results on mass outflow from active galactic nuclei and quasars are becoming available through new space missions (HST/STIS, Chandra, FUSE, XMM), ground-based observations (e.g., adaptive optics, IR spectroscopy, spectropolarimetry), and sophisticated models. The purpose of the workshop will be to review the new observations and their implications, investigate the correspondence between the observations and models, and stimulate new directions for future collaborative efforts. Scientific topics will include intrinsic UV and X-ray absorption, broad absorption-line quasars, radial outflow in the narrow-line region, photoionization and shock models of the emission-line and absorption regions, dynamical outflow models, and connection to the central engine and broad-line region.

SCIENTIFIC ORGANIZING COMMITTEE:
Michael Crenshaw (Catholic University, GSFC), co-chair
Steven Kraemer (Catholic University, GSFC), co-chair
Ian George (University Space Research Association, GSFC)
Frederick Hamann (University of Florida)
John Hutchings (Dominion Astrophysical Observatory)
Smita Mathur (Ohio State University)
Norman Murray (Canadian Institute for Theoretical Astrophysics)
Hagai Netzer (Tel Aviv University)
Joe Shields (Ohio University)

CONFERENCE FORMAT:
Due to space limitations and the need for an interactive workshop, the number of participants will be limited to 80. The format of the meeting will be short (15 to 20 min.) oral presentations or posters, and extensive discussions. (The organizers reserve the right to change the presentation type to achieve a balanced program.)

LOCATION:
The workshop will be held in the Hertzfeld Auditorium of Hannan Hall at The Catholic University of America in Washington, DC. A block of rooms will be reserved at a nearby hotel, and shuttle service will be provided to and from Catholic University. Continental breakfast, lunch, and afternoon snacks will be provided at the workshop.

PRELIMINARY REGISTRATION:
If you are interested in attending this conference, please fill out the following form. This information is non-binding but will allow us to gauge participant interest, topics to be covered, and demand for housing. Future announcements concerning the scientific program and registration will only be sent to those that return this form.

Please send to crenshaw@buckeye.gsfc.nasa.gov by 20 NOVEMBER 2000

NAME:
INSTITUTION:
PRESENTATION (ORAL, POSTER, NONE):
PRELIMINARY TITLE OF PRESENTATION:
HOTEL ROOM NEEDED? (YES, NO):

Jobs

Abstracts - Thesis Abstracts - Jobs - Meetings

Postdoctoral Position Available

The astrophysics and cosmology group at the Hebrew University of Jerusalem expects to offer a postdoctoral fellowship in areas related to Active Galactic Nuclei and massive black holes, to start in the fall of 2001.

Applications should be sent to Mrs. Shula Coster at the address below by December 15, 2000. The material should include a curriculum vita, a list of publications, a brief summary of research, and three letters of recommendation. Applicants are welcome to contact Dr. Amri Wandel at amri@frodo.fiz.huji.ac.il.

The fellowship is for two years (a formal extension is required for the second year). Net income will be $20,000 per year tax free and research costs including computing and professional travel.

Send applications to Mrs. Shula Coster, Racah Institute of Physics, The Hebrew University, Jerusalem 91904, Israel fax +972-2-65864437 or by e-mail: shula@vms.huji.ac.il

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