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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

Black Hole Mass, Velocity Dispersion and the Radio Source in AGN

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include

The recent discovery of a correlation between nuclear black hole mass, $M_\bullet$, and the stellar velocity dispersion, σ_*(Gebhardt *et al.*, 2000, Ferrarese & Merritt, 2000), in elliptical galaxies and spiral bulges, has raised the question whether such a relationship exists for AGN. Estimates of $M_\bullet$ for many AGN, made using reverberation mapping techniques, allow exploration of the relationship between black hole mass, the host galaxy and the energetics of nuclear emission. However, since only a few AGN have both $M_\bullet$ and σ_* measurements, we use the [OIII] λ 5007 emission line widths on the assumption that for most AGN the forbidden line kinematics are dominated by virial motion in the host galaxy bulge. We find that a relation does exist between $M_\bullet$ and [OIII] line width for AGN which is similar to the one found by Gebhardt *et al.* (2000), although with more scatter as expected if secondary influences on the gas kinematics are also present. Our conclusion is that both active and inactive galaxies follow the same relationship between black hole mass and bulge gravitational potential. We find no compelling evidence for systematic differences in the mass estimates from reverberation mapping and stellar dynamics. We also find that for radio quiet AGN the radio power and black hole mass are highly correlated linking emission on scales of kiloparsecs with the nuclear energy source.

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example:

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preprint available at http://xxx.lanl.gov/abs/astro-ph/0009188

Strong spectral variability in NGC 7603 over 20 years

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We present results of a long-term optical variability campaign on the Seyfert 1 galaxy NGC 7603 over a period of nearly 20 years. The optical continuum and the Balmer and Helium lines varied by a factor of 5 to 10 in this broad-line Seyfert 1 galaxy. Furthermore, it is remarkable that the optical FeII line blends varied with the same amplitude as the Hα and HeI lines. During the first half of the campaign (until 1990) there was a strong correlation between Balmer decrement variations, Hβ intensity variations and emission line asymmetry. This behaviour changed afterwards when the Hβ line intensity was higher than on average.

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example:

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preprint available at http://www.uni-sw.gwdg.de/~bischoff/pub/NGC7603.html

Variability in LINERs

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A small number of LINERs have been seen to display variable Hα emission with a very broad, double-peaked profile. Recent observations with the *Hubble Space Telescope* indicate that such emission may be a common attribute of LINERs. The double-peaked or double-shouldered line profiles resemble those found in a subset of broad-line radio galaxies. Several lines of argument suggest that such features trace an outer thin accretion disk irradiated by an inner ion torus, in accord with advection-dominated accretion flow (ADAF) models. Variability monitoring of this broad Hα component thus may provide a means of testing accretion physics on small scales within these sources.

To appear in ASP Conference Proceedings "Probing the Physics of Active Galactic Nuclei by Multiwavelength Monitoring," eds. B. M. Peterson, R. S. Polidan, & R. W. Pogge

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Slow Jets in Seyfert Galaxies: NGC 1068

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We have used the Very Long Baseline Array at 5 GHz to image the nucleus of NGC 1068 at two epochs separated by 2.92 yr. No relative motion was detected between the high brightness-temperature knots within components NE and C relative to the nuclear component S1, placing an upper limit of 0.075 c on the relative component speeds at distances of 21 pc and 43 pc from the AGN. The low speed is consistent with the low bulk flow speed previously inferred from indirect arguments based on ram pressure at the bow shock and on line emission from the jet-cloud collision at cloud C. The components are probably shocks in the jet, and the bulk flow speed could conceivably be higher than the limit reported here.

for "Proceedings of the 5th EVN Symposium", Eds. J.E. Conway, A. Polatidis & R. Booth, Onsala Space Observatory, Chalmers Technical University, Gothenburg, Sweden (2000)

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STIS Echelle Observations of NGC 4151: Variable Ionization of the Intrinsic UV Absorbers[1]

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[1] Based on observations made with the NASA/ESA Hubble Space Telescope. STScI is operated by the Association of Universities for Research in Astronomy, Inc. under NASA contract NAS5-26555.
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We present echelle observations of the intrinsic UV absorption lines in the Seyfert galaxy NGC 4151, which were obtained with the Space Telescope Imaging Spectrograph (STIS) on the Hubble Space Telescope (*HST*) on 1999 July 19. The UV continuum flux at 1450 Å decreased by factor of about four over the previous two years and there was a corresponding dramatic increase in the column densities of the low-ionization absorption lines (e.g., Si II, Fe II, and Al II), presumably as a result of a decrease in the ionizing continuum. In addition to the absorption lines seen in previous low states, we identify a large number of Fe II absorption lines that arise from metastable levels as high as 4.1 eV above the ground state, indicating high densities ($> 10^6$ cm^{-3}). We find that the transient absorption feature in the blue wing of the broad C IV emission, seen in a Goddard High Resolution Spectrograph (*GHRS*) spectrum and thought to be a high-velocity C IV component, is actually a Si II fine-structure absorption line at a radial velocity of -560 km s^{-1} (relative to systemic). We also demonstrate that the "satellite" emission lines of C IV found in International Ultraviolet Explorer (*IUE*) spectra are actually regions of unabsorbed continuum plus broad emission that become prominent when the UV continuum of NGC 4151 is in a low state.

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preprint available at http://iacs.cua.edu/crenshaw/index.html and astro-ph/0009356

UV Spectropolarimetry of Narrow-line Radio Galaxies

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We present the results of UV spectropolarimetry ($\lambda_{\rm rest} \simeq 2000 - 3000$Å) and far-UV spectroscopy ($\lambda_{\rm rest} \simeq 1500 - 2000$Å) of two low-redshift narrow-line radio galaxies (NLRGs) taken with the Faint Object Spectrograph onboard the Hubble Space Telescope (HST). Spectropolarimetry of several NLRGs has shown that, by the presence of broad permitted lines in polarized flux spectrum, they have hidden quasars seen through scattered light. Imaging polarimetry has shown that NLRGs including our targets often have large scattering regions of a few kpc to $>\sim$ 10 kpc scale. This has posed a problem about the nature of the scatterers in these radio galaxies. Their polarized continuum has the spectral index similar to or no bluer than that of quasars, which favors electrons as the dominant scattering particles. The large scattering region size, however, favors dust scattering, because of its higher scattering efficiency compared to electrons.

In this paper, we investigate the polarized flux spectrum over a wide wavelength range, combining our UV data with previous optical/infrared polarimetry data. We infer that the scattering would be often caused by opaque dust clouds in the NLRGs and this would be a part of the reason for the apparently grey scattering. In the high-redshift radio galaxies, these opaque clouds could be the proto-galactic subunits inferred to be seen in the HST images. However, we still cannot rule out the possibility of electron scattering, which could imply the existence of a large gas mass surrounding these radio galaxies.

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preprint available at astro-ph 0010001 (http://xxx.lanl.gov/abs/astro-ph/0010001).

Variable Galaxies in the Hubble Deep Field

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We present results from a study to detect variable galaxies in the Hubble Deep Field North. The goal of this project is to investigate the number density of AGN at $z \simeq 1$ through the detection of variable galaxy nuclei. The advantage of HST is the ability to do accurate photometry within smaller apertures, thus allowing us to probe much lower AGN/host galaxy luminosity ratios than can be done from the ground.

The primary data sets analyzed for galactic variability follow from the original HDF-N observations (Williams *et al.* 1996) in December 1995 and a second epoch obtained two years later (Gilliland, Nugent & Phillips 1999). The second epoch data consists of 36 exposures in F814W with a total integration time of 63000 seconds (compared to 58 exposures and a total of 123600 seconds in the original HDF-N).

We have detected nuclear variability at or above the 3σ level in 8 of 633 HDF galaxies at $I_{814} \lesssim 27$. Only 2 detections would be expected by chance in a normal distribution. At least one of these 8 has been spectroscopically confirmed as a Seyfert 1 galaxy. Based on the AGN structure function for variability, the estimated luminosity of the varying component in each galaxy lies in the range $-19.5 \lesssim M_B \lesssim -15.0$. We construct an upper limit to the luminosity function for the variable nuclei and compare this to the local Seyfert LF and the LF for QSOs at $z \simeq 1$. Assuming we have detected all Seyfert-like nuclei in the HDF-N, we find no evidence for an increase in the number density of AGN at $M_B \simeq -19$ (H_o=75 km/s/Mpc, q_o=0.5). From this study, we estimate that $\sim$1–3% of field galaxies with $I \lesssim 27$ may contain a nuclear AGN.

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