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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

A Hubble Space Telescope Survey of Extended [OIII]λ5007ÅEmission in a Far-Infrared Selected Sample of Seyfert Galaxies: Observations

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We present a Hubble Space Telescope (HST) survey of extended [OIII] emission for a sample of 60 Seyfert galaxies (22 Seyfert 1's and 38 Seyfert 2's), selected based on their far infrared properties. The observations for 42 of these galaxies were done in a snapshot survey with WFPC2. The remaining 18 were obtained from the HST archive, most of which were observed with the same configuration. These observations cover 68% of the objects in the sample defined by Kinney et al. (2000), and create a valuable dataset for the study of the Narrow Line Region (NLR) properties of Seyfert galaxies. In this paper, we present the details of the observations, reductions, and measurements. We also discuss the extended structure of individual sources, and the relation of this emission to the radio and host galaxy morphology. We also address how representative the subsample of [O III]-imaged galaxies is of the entire sample, and possible selection effects that may affect this comparison of the properties of Seyfert 1 and Seyfert 2 galaxies.

To appear in ApJS October 2003 issue.

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preprint available at astro-ph/0307254

A Hubble Space Telescope Survey of Extended [OIII]λ5007ÅEmission in a Far-Infrared Selected Sample of Seyfert Galaxies: Results

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We present the results of a Hubble Space Telescope (HST) survey of extended [OIII] emission in a sample of 60 nearby Seyfert galaxies (22 Seyfert 1's and 38 Seyfert 2's), selected by mostly isotropic properties. The comparison between the semi major axis size of their [OIII] emitting regions (R_{Maj}) shows that Seyfert 1's and Seyfert 2's have similar distributions, which seems to contradict Unified Model predictions. We discuss possible ways to explain this result, which could be due either to observational limitations or the models used for the comparison with our data. We show that Seyfert 1 Narrow Line Regions (NLR's) are more circular and concentrated than Seyfert 2's, which can be attributed to foreshortening in the former. We find a good correlation between the NLR size and luminosity, following the relation $R_{Maj} \propto L([OIII])^{0.33\pm0.04}$, which is flatter than a previous one found for QSO's and Seyfert 2's. We discuss possible reasons for the different results, and their implications to photoionization models. We confirm previous results which show that the [OIII] and radio emission are well aligned, and also find no correlation between the orientation of the extended [OIII] emission and the host galaxy major axis. This agrees with results showing that the torus axis and radio jet are not aligned with the host galaxy rotation axis, indicating that the orientation of the gas in the torus, and not the spin of the black hole, determine the orientation of the accretion disk, and consequently the orientation of the radio jet.

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The detection of stellar velocity dispersion drops in the central regions of five isolated Seyfert spirals

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We analyze the kinematics of the central regions of five isolated spiral galaxies from the DEGAS sample (IC 184, UGC 3223, NGC 2639, NGC 6814 and NGC 6951), by using long slit spectroscopic data in the CaII triplet range ($\approx$ 8600Å) obtained with a 4m-class telescope. A drop of the velocity dispersions in the innermost $\pm$(1-3) arcsec is observed in these five galaxies. The available HST images for our sample together with another nine galaxies with reported velocity dispersion drops, are also used to investigate whether the morphological inner structures are related to the kinematical drops. Evidence for disk-like shapes is found in 12 out of the 14 cases. The only exceptions are NGC 6814 and NGC 6951. Existing N-body simulations including stars, gas and star formation predict that such a drop is most probably due to a young stellar population born from dynamically cold gas accreted in a circumnuclear disk formed during an episode of central gas accretion driven by a bar. The equivalent widths of the Calcium triplet lines for our 5 galaxies in the regions corresponding spatially to the drops reach a local maximum, implying the presence of a different stellar population, whose properties could help constraining the models.

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Mass Loss from the Nuclei of Active Galaxies

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Blueshifted absorption lines in the UV and X-ray spectra of active galaxies reveal the presence of massive outflows of ionized gas from their nuclei. The "intrinsic" UV and X-ray absorbers show large global covering factors of the central continuum source, and the inferred mass loss rates are comparable to the mass accretion rates. Many absorbers show variable ionic column densities, which are attributed to a combination of variable ionizing flux and motion of gas into and out of the line of sight. Detailed studies of the intrinsic absorbers, with the assistance of monitoring observations and photoionization models, provide constraints on their kinematics, physical conditions, and locations relative to the central continuum source, which range from the inner nucleus (~0.01 pc) to the galactic disk or halo (~10 kpc). Dynamical models that make use of thermal winds, radiation pressure, and/or hydromagnetic flows have reached a level of sophistication that permits comparisons with the observational constraints.

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available online as a "review in advance" at http://arjournals.annualreviews.org/toc/astro/0/0
printed volume available in September/October 2003

Adaptive Optics Imaging and Spectroscopy of Cygnus A: I. Evidence for a Minor Merger

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We present Keck II adaptive optics near infrared imaging and spectroscopic observations of the central regions of the powerful radio galaxy Cygnus A. The $0''.05$ resolution images clearly show an unresolved nucleus between two spectacular ionization/scattering cones. We report the discovery of a relatively bright ($K' \sim 19$) secondary point source $0''.4$ or 400 pc in projection southwest of the radio nucleus. The object is also visible in archival *Hubble Space Telescope* optical images, although it is easily confused with the underlying structure of the host. Although the near infrared colors of this secondary point source are roughly consistent with those of an L-dwarf, its spectrum and optical-to-infrared spectral energy distribution (SED) virtually rule out the possibility that it may be any foreground projected object. We conclude that the secondary point source is likely to be an extragalactic object associated with Cygnus A. We consider several interpretations of the nature of this object, including: a young star cluster peering through the dust at the edge of one of the ionization cones; an older, large globular cluster; a compact cloud of dust or electrons that is acting as a mirror of the hidden active nucleus; and the dense core of a gas stripped satellite galaxy that is merging with the giant elliptical host. The data presented here are most consistent with the minor merger scenario. The spectra and SED of the object suggest that it may be a densely packed conglomeration of older stars heavily extincted by dust, and its high luminosity and compact nature are consistent with those of a satellite that has been stripped to its tidal radius. Further spectroscopic observations are nevertheless necessary to confirm this possibility.

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preprint available at http://xxx.lanl.gov/abs/astro-ph/0307376

Decelerating Flows in TeV Blazars: A Resolution to the BL Lac – FR I Unification Problem

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TeV emission from BL Lacertae (BL) objects is commonly modeled as Synchrotron-Self Compton (SSC) radiation from relativistically moving homogeneous plasma blobs. In the context of these models, the blob Lorentz factors needed to reproduce the corrected for absorption by the diffuse IR background (DIRB) TeV emission are large ($\delta \sim 50$). The main reason for this is that stronger beaming eases the problem of the lack of $\sim$ IR-UV synchrotron seed photons needed to produce the de-absorbed $\sim$ few TeV peak of the spectral energy distribution (SED). However, such high Doppler factors are in strong disagreement with the unified scheme, according to which BLs are FR I radio galaxies with their jets closely aligned to the line of sight. Here, motivated by the detection of sub-luminal velocities in the sub-pc scale jets of the best studied TeV blazars, MKN 421 and MKN 501, we examine the possibility that the relativistic flows in the TeV BLs decelerate. In this case, the problem of the missing seed photons is solved because of Upstream Compton (UC) scattering, a process in which the upstream energetic electrons from the fast base of the flow 'see' the synchrotron seed photons produced in the slow part of the flow relativistically beamed. Modest Lorentz factors ($\Gamma \sim 15$), decelerating down to values compatible with the recent radio interferometric observations, reproduce the $\sim$ few TeV peak energy of these sources. Furthermore, such decelerating flows are shown to be in agreement with the BL - FR I unification, naturally reproducing the observed BL/FR I broad band luminosity ratios.

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Jobs

Department Lectureship in Astrophysics

University of Oxford
UK

The Physics Department proposes to appoint a Departmental Lecturer in Astrophysics for a 2 year post (with possibility of a one year extension) to **commence 1 October 2003, or as soon as possible thereafter.**

Applications from candidates wishing to work in any area of our research programme (see http://www-astro.physics.ox.ac.uk/research/) are invited. Questions can be address to Professor J Silk (silk@astro.ox.ac.uk) or to Professor R Davies (roger.davies@astro.ox.ac.uk).

Applications should include a description of research and teaching experience, a statement of future research interests, a list of major publications, and a curriculum vitae, and be sent to the above address, quoting job reference DB03002. Three referees (not more than two from the same institution) should be asked to consider the selection criteria in the further particulars which can be found at http://www-astro.physics.ox.ac.uk/jobs.html, and send a letter of reference (or fax, or email) directly to the above address to arrive by the **closing date of 15 August 2003.**

Salary Scale (Departmental Lecturer) 18,265 - 24,121 Pounds sterling per annum

Applications to be sent for the attention of Mrs Sue Blackshaw, quoting reference DB03002 (email: sb@astro.ox.ac.uk)

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