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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.
Matt Redman

Abstracts of recently accepted papers

Formation of Large-Scale Obscuring Wall and AGN Evolution Regulated by Circumnuclear Starbursts

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By considering the radiative force by a circumnuclear starburst as well as an AGN, we analyze the equilibrium configuration and the stability of dusty gas in the circumnuclear regions. It is found that the radiative force by an intensive starburst can support a stable gaseous wall with a scale-height of several hundred parsecs. Moreover, by taking the simple stellar evolution in the starburst into account, we find that the covering factor of the wall decreases on a time-scale of several 10^7 yr. The large-scale wall, if formed, works to obscure the nucleus due to the dust opacity. Hence, it is anticipated that the index of AGN type tends to shift from higher to lower in several 10^7 yr according as the circumnuclear starburst becomes dimmer. On the other hand, if the AGN itself is brighter than the circumnuclear starburst (e.g. quasar case), no stable large-scale wall forms. In that case, the AGN is highly probably identified as type 1. The present mechanism may provide a physical explanation for the putative correlation between AGN type and host properties that Sy2's are more frequently associated with circumnuclear starbursts than Sy1's, whereas quasars are mostly observed as type 1 regardless of star-forming activity in the host galaxies.

Accepted by Astrophysical Journal Letters

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preprint available at astro-ph/9906226

On X-ray Variability in Seyfert Galaxies

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This paper presents a quantification of the X-ray variability amplitude for 79 *ASCA* observations of 36 Seyfert 1 galaxies. We find that consideration of sources with the narrowest permitted lines in the optical band introduces scatter into the established correlation between X-ray variability and nuclear luminosity. Consideration of the X-ray spectral index and variability properties together shows distinct groupings in parameter space for broad and narrow-line Seyfert 1 galaxies, confirming previous studies. A strong correlation is found between hard X-ray variability and FWHM Hβ. A range of nuclear mass and accretion rate across the Seyfert population can explain the differences observed in X-ray and optical properties. An attractive alternative model, which does not depend on any systematic difference in central mass, is that the circumnuclear gas of NLSy1s is different to BLSy1s in temperature, optical depth, density or geometry.

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Akn 564: an unusual component in the X-ray spectra of NLSy1 galaxies

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We present an *ASCA* observation of the narrow-line Seyfert 1 (NLSy1) Arakelain 564. The X-ray light curve shows rapid variability, but no evidence for energy-dependence to these variations, within the 0.6 – 10 keV bandpass. A strong (EW $\sim$ 70 eV) spectral feature is observed close to 1 keV. A similar feature has been observed in TON S180, another member of the NLSy1 class of objects, but has not been observed in broad-line Seyfert galaxies. The feature energy suggests a large contribution from Fe L-shell lines but its intensity is difficult to explain in terms of emission and/or absorption from photoionized gas. The models which predict most emission at 1 keV are characterized by extreme values of column density, Fe abundance and ionization parameter. Models based on gas in thermal equilibrium with kT$\sim$ 1keV provide an alternative parameterization of the soft spectrum. The latter may be interpreted as the hot intercloud medium, undergoing rapid cooling and producing strong Fe L-shell recombination lines. In all cases the physical conditions are rather different from those observed in broad-line Seyferts.

The hard X-ray spectrum shows a broad and asymmetric Fe Kα line of large equivalent width ($\sim$ 550 eV) suggestive of significant emission from the inner accretion disk. The profile can be explained by a neutral disk viewed at $\sim$ 60 degrees to the line-of-sight, contrary to the hypothesis that NLSy1s are viewed pole-on. The large EW of this line, the strong 1 keV emission and the strong optical Fe emission lines all suggest an extreme Fe abundance in this and perhaps other NLSy1s.

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The exceptional X-ray properties of the NLSy1 galaxy RX J0134.3-4258

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The Narrow-line Seyfert 1 galaxy RX J0134.3-4258 was detected during the *ROSAT* all-sky survey with an ultrasoft spectrum (Greiner 1996). Our later pointed observation led to the discovery of drastic spectral variability. Here, we present the first detailed analysis of the soft X-ray properties of this peculiar source.

4 pages; contribution to the proc. of *Astrophysical Dynamics* (Evora, April 14-16, 1999), to appear in Ap&SS

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Preprint and related papers on RX J0134.3-4258 available at http://www.xray.mpe.mpg.de/~skomossa/

Formation of Massive Black Holes in Early Mergers ?

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We review theoretical and observational arguments favoring a scenario in which a typical massive black hole (MBH) is formed in the merger core of colliding disk systems at high z during the build-up of a spheroid. Low-mass ($\sim 10^{5-6} M_{\odot}$) *seed* black

holes are assumed to have been formed earlier. The most massive black holes giving rise to the most luminous active galactic nuclei (AGN) in active phases are expected to grow in violent mergers of large disk-plus-bulge systems that lead to giant elliptical galaxies, the typical hosts of radio galaxies and quasars. We consider current ultraluminous infrared galaxies (ULIRG) as systems closely resembling the predecessors of early formed massive ellipticals. As an example, we discuss the evidence for an AGN in the merging system NGC 6240 which we advertize as a prototypical active ULIRG, obscured in X-rays by a high column density absorber.

18 pages; contribution to the proc. of *Trends in Astrophysics and Cosmology* (Physikzentrum Bad Honnef, August 24-28, 1998), to appear in Lecture Notes in Physics (W. Kundt, C. v.d.Bruck, eds)

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

Dusty warm absorbers: The case of IRAS 13349+2438

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Warm absorbers are an important new probe of the central region of active galaxies (AGN). Observing and modeling this component provides a wealth of information on the nature of the warm absorber itself, its relation to other components of the active nucleus, and the intrinsic AGN X-ray spectral shape.

We briefly review the general properties of dusty warm gas. For the first time, we then apply such a model to the IR loud quasar IRAS 13349+2438. It was the first to be suggested to host a *dusty* warm absorber (Brandt et al. 1996), but has not yet been modeled as such.

4 pages; contribution to the proc. of *Astrophysical Dynamics* (Evora, April 14-16, 1999), D. Berry, D. Breitschwerdt, A. da Costa, J. Dyson (eds); to appear in Ap&SS

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The 10-200 μm spectral energy distribution of the prototype Narrow-Line X-ray galaxy NGC 7582

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We present the spectral energy distribution (SED) between 10 and 200 μm obtained for the prototype Narrow-Line X-Ray Galaxy NGC 7582 with ISOPHOT, the photometer on board the *Infrared Space Observatory.* The emission is spatially extended and we separated for the first time the nuclear and extranuclear infrared SEDs. The nuclear luminosity ($L_{\rm IR} \sim 4.5 \times 10^{10}\ L_{\odot}$) is dominated by cold ($T \sim 32$ K) dust emission mainly due to star formation activity; warm ($T \sim 122$ K) dust emission is also present and is probably related to the active nucleus. In addition to a cold component of 30 K, the extranuclear SED ($L_{\rm IR} \sim 1.7 \times 10^{10}\ L_{\odot}$) shows emission by colder ($T \sim 17$ K) dust: this very cold component comprises 90% of the total dust mass of $9.8 \times 10^{7}\ M_{\odot}$.

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preprint available at:astro-ph/9906444

X-ray emission mechanisms of LINERs

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We present here an analysis of the X-ray properties of a sample of LINER galaxies observed with the *ROSAT* PSPC and HRI instruments. A spatial analysis shows that the bulk of the X-ray emission is consistent with arising from a point source; some extended emission appears at weak emission levels. The X-ray spectra are formally best described by a powerlaw with

photon index $\Gamma_x \approx -2$ or thermal emission from a Raymond-Smith plasma with highly subsolar abundances ($Z \leq 0.1$). Several emission mechanisms that might contribute to the observed X-ray spectra are discussed. In particular, we take the very subsolar abundances derived from Raymond-Smith fits as an indication of a more complex emission mechanism, like the presence of a second hard component or plasma out of collisional-ionization equilibrium.

4 pages; contribution to the proc. of *Astrophysical Dynamics* (Evora, April 14-16, 1999); D. Berry, D. Breitschwerdt, A. da Costa, J. Dyson (eds); to appear in Ap&SS

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Preprint available at http://www.xray.mpe.mpg.de/~skomossa/ and as MPE Preprint 466/1999

Chimneys in the starburst galaxy M82

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We present MERLIN and VLA observations at 1.4 and 5 GHz of the diffuse radio emission in the centre of M82. We detect a large expanding shell of ionised gas surrounding the brightest SNR 41.95+57.5 with a diameter of $\sim$ 100 pc and an expansion velocity of $\sim$ 100 km/s. We observe a 50pc-scale 'blow-out' from this region in the form of a 'cone' of missing 5 GHz continuum emission which appears to be an excellent example of a galactic chimney.

On larger radio scales we observe four chimney structures extending out to the north $\sim$ 100 - 200 pc along the minor axis. One of these features is almost certainly related to the 50pc-scale blow-out from 41.95+57.5, although this is not the most prominent feature. The other features have also been traced to expulsion of material from the very centre by using an 'unsharp masked' image from 5 GHz VLA B-array observations, with the SNR removed.

We interpret these chimney features as the base of the superwind, which implies that the ejection of material into the halo does not occur smoothly over the starburst region. Instead, very localised venting of hot gas is clearly in evidence.

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E-mail contact: mpr@ast.man.ac.uk,
preprint available at ftp://www.ast.man.ac.uk/outgoing/mpr/m82.ps.gz

Meetings

Darwin and Astronomy: the Infrared Space Interferometer (IRSI)
Stockholm, Sweden
November 17 - 19, 1999

Organisers: Swedish National Space Board (SNSB), European Space Agency (ESA) and Stockholm Observatory

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This is the first announcement for the conference 'Darwin and Astronomy - the Infrared Space Interferometer' to be held in Stockholm, Sweden, from November 17 to 19, 1999. The conference is organised by the Swedish National Space Board (SNSB) and the European Space Agency (ESA), with support by Stockholm Observatory.

All relevant documentation regarding the conference, including electronic forms for registration and hotel reservations, can be found on the web at

http://www.astro.su.se/~index.html

Purpose of this conference:

- to identify the most profound questions in the fields of modern astrophysics that can be adressed with a space-based interferometer working from 5 to 25 μm with baselines of up to 500 m and much more sensitive than ground-based instruments.

- to provide insights into the optimisation of the design of the instrument in the light of those questions.

It is envisaged that 30% of the time of the ESA candidate space mission for the Darwin infrared space interferometer will be devoted to general astrophysics. While much of the design will driven by its primary aim of extrasolar planetary systems studies, the astrophysical aims will also be important factors in the design.

This conference will start from a description of the present Darwin concept and its performance in different astrophysical observations. The inputs from participants in this conference will then constitute an important driving mechanism for the development of design characteristics of the instrument.

If you want to understand the prospects for space infrared interferometer astronomy or if you want to affect the design of Darwin so it can address your needs, you should attend this conference.

Topics and invited speakers include:
Galaxies and their Evolution Andrew Wilson (confirmed),
Active Galactic Nuclei/GC Reinhard Genzel (confirmed),
Observational Cosmology Malcolm Longair (tbc),
Supernovae (and Cosmology) Jason Spyromilio (tbc),
AGB and Related Phases of Stellar Evolution Hans Olofsson (confirmed),
Star Formation and Early Stellar Evolution Stephen Strom (confirmed),
Planet Formation and Disk Evolution Pawel Artymowicz (confirmed),
Physics of Planets Tristan Guillot (confirmed),
Planetology and Zodiacal Light Jane Luu (confirmed),
Astrobiology Baruch Blumberg (tbc),
Planets and Life Tobias Owen (tbc),
Origin of Life André Brack (confirmed),
Nulling Interferometry Neville Woolf and Bertrand Mennesson (confirmed),
Darwin - the Infrared Space Interferometer Malcolm Fridlund (confirmed),
TPF - the Terrestial Planet Finder Chas Beichman (confirmed),
GAIA - the Global Astrometric Interferometer for Astrophysics Lennart Lindegren (confirmed),
NGST - the Next Generation Space Telescope Peter Jakobsen (confirmed),
VLTI - the Very Large Telescope Interferometer Francesco Paresce (confirmed),
ALMA - the Atacama Large Millimeter Array Roy Booth (tbc)

Scientific Organising Committee: R. Genzel (chair), R. Liseau (co-chair), G. Arrhenius, C. Beichman, A. Brack, F. Capaccioni, C. Eiroa, M. Fridlund, T. Herbst, A. Léger, L. Nordh, A. Penny, D. Queloz, H. Roettgering, S. Volonte

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