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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

Supersolar metal abundances and the Broad Line Region of Narrow-line Seyfert 1 galaxies

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Narrow-line Seyfert 1 galaxies (NLSy1) are intriguing due to their extreme continuum and emission line properties which are not yet well understood. This paper is motivated by the recent suggestion that NLSy1 galaxies might be young active galactic nuclei (AGN) and that they may have supersolar metal abundances. We have examined the stability of broad emission line region (BLR) clouds under isobaric perturbation and its dependence on gas metal abundances. We show that supersolar metallicity increases the range where multiple phases in pressure balance may exist. This is particularly important for NLSy1s with steep X-ray spectra where it delays the trend of hindrance of a multi-phase equilibrium. Finally, the role of warm absorbers in the context of this scenario is assessed.

A&A, in press

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Detection of an X-ray jet in 3C 371 with Chandra

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We report the detection at X-rays of the radio/optical jet of 3C 371, from a short (10 ks) Chandra exposure in March 2000. We also present a new MERLIN observation at 1.4 GHz together with a renalysis of the archival HST WFPC2 F555W image. Despite the limited signal-to-noise ratio of the Chandra data, the X-ray morphology is clearly different from that of the radio/optical emission, with the brightest X-ray knot at 1.7" from the nucleus and little X-ray emission from the brightest radio/optical knot at 3.1". We construct the spectral energy distributions for the two emission regions at 1.7" and 3.1". Both show that the X-ray flux is below the extrapolation from the radio-to-optical continuum, suggesting moderately beamed synchrotron from an electron population with decreasing high energy cut-off as a plausible emission mechanism.

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The Infrared Continuum Radiation of NGC1808: A PAH and Polarisation Study

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The paper is devoted to the understanding of the infrared emission of nuclear regions in galaxies.
a) ISO data of NGC 1808 are presented: spectro–photometry from 5.1 to 16.4 μm; a $25'' \times 25''$ map at 6μm and 170μm photometry.
b) The data are complemented by a polarization measurement at 170μm (2.5$\pm$0.4% at position angle 94°$\pm$5°) and a map at 6μm. In the map, the degree of polarisation goes up to 20% in the outer regions. We argue that the polarisation is produced by emission of big grains and exclude very small grains and PAHs or scattering and extinction.
c) The mid infrared spectrum shows, beside the main emission bands, a so far unknown plateau of PAH features in the $\geq 13\,\mu$m region.
d) The total spectrum can be fit under the assumption of optically thin emission. However, such a model fails to reproduce the 25μm point and implies that the mid infrared is due to very small grains and PAHs. These particles would then also have to be responsible for the 6μm polarisation, which is unlikely.
e) To avoid these difficulties, we successfully turn to a radiative transfer model whose major feature is the existence of *hot spots* produced by the dust clouds around OB stars. We demonstrate the decisive influence on the mid infrared spectrum of both the PAHs and the hot spots.

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Centaurus A: Molecular gas shells or large-scale outflow?

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In order to test if the molecular "shells" observed by Charmandaris et al. (2000) could be due to a molecular outflow, we have mapped CO in $J = 1 \rightarrow 0$ and $2 \rightarrow 1$ along the jet axis of Centaurus A. Where our map coincides with their observed positions, like them, we obtain 4σ detections with a similar antenna temperature for CO $1 \rightarrow 0$, although both transitions appear to be somewhat wider in velocity dispersion than theirs. As well as these, we have several tentative detections at distances of $\gtrsim 5$ kpc from the nucleus, and although these results are of too poor quality in order to verify or refute the shell model in favour of a molecular outflow, our observations of the inner kpc do suggest that at least a small-scale outflow is a possibility. Whether this would be a component of a larger-scale outflow or exists in conjunction with the molecular gas shells will have to wait for a much more extensive mapping of the large-scale gas distribution in Centaurus A, for which these and the results of Charmandaris et al. (2000) will hopefully provide sufficient motivation.

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Structural properties of spiral galaxies with and without an AGN: morphology and kinematics

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The analysis of a sample of 30 isolated spiral galaxies with and without an AGN results in active and control galaxies having similar bulge and disk properties (since both samples are selected to match in morphological and bar classification, they have similar bar percentages). Secondary bars seem also to be indistinguishable. The central kinematics (both stellar and gas) are also studied in order to put some constraints on the processes required to fuel AGNs. Together with previous results, this points to AGNs being an episode of the life of galaxies, providing that the fuel is available and the accumulation mechanisms are at work.

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Hubble Space Telescope Observations of the CfA Seyfert 2s: Near-infrared Surface Photometry and Nuclear Bars

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We present near-infrared (NIR) J and H surface photometry of 24 of the nearby Seyfert 1.8, 1.9 and 2 galaxies from the CfA Seyfert sample. The excellent angular resolution of the *Hubble Space Telescope* (*HST*) probes spatial scales as small as tens of parsecs in most of these AGN and is sensitive to the presence of nuclear bars and other potential signatures of the AGN fueling process that channels host galaxy gas and dust to the nuclear region. We have used elliptical isophote techniques to search for nuclear bars in all of these galaxies and have employed a two-dimensional fitting technique to model the nuclear point source and surface brightness distribution of a bright subsample of these galaxies in an attempt to alleviate the impact of the nuclear point source on our sensitivity to nuclear bars. We find stellar nuclear bar candidates in four of these galaxies: Mrk 471, Mrk 270, Mrk 573, and NGC 5929, nearly 20% of the total sample. The percentage rises to $\sim 30\%$ when systems with disturbed morphologies or high inclinations are excluded. The nuclear bars in Mrk 573 and Mrk 270 exhibit some evidence for dust lanes along their leading edges, analogous to the structures seen in host galaxy bars, while the dust lanes in Mrk 471 and NGC 5929 exhibit a more complex morphology. The fact that most of these AGN do not appear to contain stellar nuclear bars suggests that they are not the fueling mechanism for most low-luminosity AGN.

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Atomic and molecular gas in the merger galaxy NGC 1316 (Fornax A) and its environment

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We present and interpret observations of atomic and molecular gas toward the southern elliptical galaxy NGC 1316 (Fornax A), a strong double-lobe radio source with a disturbed optical morphology that includes numerous shells and loops. The ^{12}CO(1–0), ^{12}CO(2–1), and HI observations were made with SEST and the VLA. CO emission corresponding to a total molecular hydrogen mass of $\sim 5\times10^{8}$ $M_{\odot}$ was detected toward the central position as well as northwest and southeast of the nucleus in the regions of the dust patches. The origin of that gas is likely external and due to accretion of one or several small gas-rich galaxies. HI was not detected in the central region of NGC 1316, but $\sim 2\times10^{7}$ $M_{\odot}$ of atomic gas was found toward the giant HII region discovered by Schweizer (1980) located 6'.7 (or 36.2 kpc) from the nucleus. HI was also found at three other locations in the outer part of NGC 1316. The HI distributions and kinematics of the two nearby spiral companions of NGC 1316, NGC 1317 (a barred galaxy to the north) and NGC 1310 (to the west) could be studied. Both galaxies have unusually small HI disks that may have been affected by ram-pressure stripping.

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Estimation of Central Black Hole Masses in Low-Luminosity Active Galactic Nuclei

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We analyzed six low-luminosity active galactic nuclei (hereafter LLAGNs), which consist of two bright LINERs (low-ionization nuclear emission line region) with broad Hα, and of four bright low-luminosity Seyferts observed by the X-ray satellite ASCA. We examined the time variabilities of these targets, and found that most targets show no significant time variabilities, although these galaxies belong to LLAGNs. By applying Fourier analysis to their light curves in the 2–10 keV band, we obtained the lower limits of their time variability scales, which correspond to their central black hole masses greater than several times $10^6 M_{\odot}$. Our result suggests that these LLAGNs are harbors of super-massive black holes, but the emitting powers are only $< 1\%$ of the Eddington luminosities of the central engines in the LLAGNs due to their small accretion rates. Since a black hole would grow by mass accretion, it is hard to create such a super-massive black hole under a small accretion rate. Therefore, the mass-accretion rates in the past must have been larger than those at present, and the galaxies have probably been as luminous as QSOs. This will be a hint to find out the cause of the lack of QSOs in the local universe.

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Multiwavelength Monitoring of the Narrow-Line Seyfert 1 Galaxy Akn 564. III. Optical Observations and the Optical–UV–X-ray Connection

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We present the results of a two-year long optical monitoring program of the narrow-line Seyfert 1 galaxy Akn 564. The majority of this monitoring project was also covered by X-ray observations (*RXTE*) and for a period of $\sim$50 days, we observed the galaxy in UV (*HST*) and X-rays (*RXTE* & *ASCA*) simultaneously with the ground-based observations. Rapid and large-amplitude variations seen in the X-ray band, on a daily and hourly time-scale, were not detected at optical and UV wavelengths, which in turn exhibited much lower variability either on short (one day) or long (several months) time-scales. The only significant optical variations can be described as two 2–4 day events with $\sim$10% flux variations. We detect no significant optical line variations and thus cannot infer a reverberation size for the broad-line region. Similarly, the large X-ray variations seem to vanish when the light curve is smoothed over a period of 30 days. The UV continuum follows the X-rays with a lag of $\sim$0.4 days, and the optical band lags the UV band by $\sim$2 days. No significant correlation was found between the entire X-ray dataset and the optical band. Focusing on a 20-day interval around the strongest optical event we detect a significant X-ray–optical correlation with similar events seen in the UV and X-rays. Our data are consistent with reprocessing models on the grounds of the energy emitted in this single event. However, several large X-ray flares produced no corresponding optical emission.

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