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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.
Matt Redman

Abstracts of recently accepted papers

Jet directions in Seyfert galaxies: B and I imaging data

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We present the results of broad-band B and I imaging observations for a sample of 88 Seyfert galaxies (29 Seyfert 1's and 59 Seyfert 2's), selected from a mostly isotropic property, the flux at 60μm. We also present the B and I imaging results for an additional sample of 20 Seyfert galaxies (7 Seyfert 1's and 13 Seyfert 2's), selected from the literature and known to have extended radio emission. The I band images are fitted with ellipses to determine the position angle and ellipticity of the host galaxy major axis. This information will be used in a future paper, combined with information from radio observations, to study the orientation of radio jets relative to the plane of their host galaxies (Kinney et al. 2000). Here we present surface brightness profiles and magnitudes in the B and I bands, as well as mean ellipticities and major axis position angles.

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Jet directions in Seyfert galaxies

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Here we present the study of the relative angle between the accretion disk (or radio jet) and the galaxy disk for a sample of Seyfert galaxies selected from a mostly isotropic property, the 60μm flux, and warm infrared colors. We used VLA A-array 3.6cm continuum data and ground based optical imaging, homogeneously observed and reduced to minimize selection effects. For parts of the analysis we enlarged the sample by including galaxies serendipitously selected from the literature. For each galaxy we have a pair of points (i,δ), which are the inclination of the galaxy relative to the line of sight and the angle between the jet projected into the plane of the sky and the host galaxy major axis, respectively. For some galaxies we also had information about which side of the minor axis is closer to Earth. This data is combined with a statistical technique, developed by us, to determine the distribution of β angles *in 3 dimensions*, the angle between the jet and the host galaxy plane axis.

We found from an initial analysis of the data of the 60μm sample, where Seyfert 1's and 2's were not differentiated, that the observed distribution of i and δ values can be well represented either by a homogeneous $\sin\beta$ distribution in the range $0° \leq \beta \leq 90°$, or $0° \leq \beta \leq 65°$, but not by an equatorial ring. A more general model, which tested $\beta-$distributions in the range $\beta_1 \leq \beta \leq \beta_2$, for different ranges of β_1 and β_2 values, required β_2 to be larger than 65° and gave preference for β_1 smaller than 40° - 50°. An important result from our analysis was obtained when we distinguished if the jet was projected against the near or the far side of the galaxy, and differentiated between Seyfert 1's and Seyfert 2's, which showed that the model could not represent Seyfert 1's adequately. We found that the inclusion of viewing angle restrictions for Seyfert 1's, namely, that a galaxy can only be recognized as a Seyfert 1 if the angle between the jet and the line of sight ($|\phi|$) is smaller than a given angle ϕ_c and that the galaxy inclination i is smaller than an angle i_c, gave rise to statistically acceptable models. This indication that there is a difference in viewing angle to the central engine between Seyfert 1's and Seyfert 2's is a direct and independent confirmation of the underlying concepts of the Unified Model.

We discuss possible explanations for the misalignment between the accretion disk and the host galaxy disk, which are: warping of the accretion disk by self-irradiation instability, by the Bardeen-Petterson effect, or by a misaligned gravitational potential of a nuclear star cluster surrounding the black hole, as well as feeding of the accretion disk by a misaligned inflow of gas from minor mergers, capture of individual stars or gas from the nuclear star cluster, or the capture of individual molecular clouds from the host galaxy.

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X-ray photoionized plasma diagnostics with Helium-like ions. Application to Warm Absorber-Emitter in Active Galactic Nuclei.

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We present He-like line ratios (resonance, intercombination and forbidden lines) for totally and partially photoionized media. For solar plasmas, these line ratios are already widely used for density and temperature diagnostics of coronal (collisional) plasmas. In the case of totally and partially photoionized plasmas, He-like line ratios allow for the determination of the ionization processes involved in the plasma (photoionization with or without an additional collisional ionization process), as well as the density and the electronic temperature.
With the new generation of X-ray satellites, Chandra/AXAF, XMM and Astro-E, it will be feasible to obtain both high spectral resolution and high sensitivity observations. Thus in the coming years, the ratios of these three components will be measurable for a large number of non-solar objects.
In particular, these ratios could be applied to the Warm Absorber-Emitter, commonly present in Active Galactic Nuclei (AGN). A better understanding of the Warm Absorber connection to other regions (Broad Line Region, Narrow Line Region) in AGN (Seyferts type-1 and type-2, low- and high-redshift quasars...) will be an important key to obtaining strong constraints on unified schemes.
We have calculated He-like line ratios, for Z=6, 7, 8, 10, 12 and 14, taking into account the upper level radiative cascades which we have computed for radiative and dielectronic recombinations and collisional excitation. The atomic data are tabulated over a wide range of temperatures in order to be used for interpreting a large variety of astrophysical plasmas.

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Strong, Variable Circular Polarization in PKS 1519−273

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We report strong variability in the circular and linear polarization of the intraday variable source PKS 1519-273. The circular polarization varies on a timescale of hours to days at frequencies between 1.4 and 8.6 GHz, and is strongly correlated with variations in the total intensity at 4.8 and 8.6 GHz. We argue that the variability is due to interstellar scintillation of a highly compact ($15 - 35\mu$as) component of the source with $-3.8 \pm 0.4\%$ circular polarization at 4.8 GHz. We find that no simple model for the circular polarization can account for both the high magnitude and the frequency dependence in PKS 1519-273 at centimeter wavelengths.

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Resolved Spectroscopy of the Narrow-Line Region in NGC 1068: Kinematics of the Ionized Gas

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We have determined the radial velocities of the [O III] emitting gas in the inner narrow-line region (NLR) of the Seyfert 2 galaxy NGC 1068, along a slit at position angle 202°, from STIS observations at a spatial resolution of $0''.1$ and a spectral resolving power of $\lambda/\Delta\lambda \approx 1000$. We use these data to investigate the kinematics of the NLR within $6''$ (∼430 pc) of the nucleus. The emission-line knots show evidence for radial acceleration, to a projected angular distance of $1''.7$ in most cases, followed by deceleration that approaches the systemic velocity at a projected distance of $\sim4''$. We find that a simple kinematic model of biconical radial outflow can match the general trend of observed radial velocities. In this model, the emitting material is evacuated along the bicone axis, and the axis is inclined 5° out of the plane of the sky. The acceleration of the emission-line clouds provides support for dynamical models that invoke radiation and/or wind pressure. We suggest that the deceleration of the clouds is due to their collision with a patchy and anistropically distributed ambient medium.

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The Elusive Active Nucleus of NGC 4945

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We present new HST NICMOS observations of NGC 4945, a starburst galaxy hosting a highly obscured active nucleus that is one of the brightest extragalactic sources at 100 keV. The HST data are complemented with ground based [FeII] line and mid–IR observations. A 100pc-scale starburst ring is detected in Paα, while H_2 traces the walls of a super bubble opened by supernova-driven winds. The conically shaped cavity is particularly prominent in Paα equivalent width and in the Paα/H_2 ratio. Continuum images are heavily affected by dust extinction and the nucleus of the galaxy is located in a highly reddened region with an elongated, disk-like morphology. No manifestation of the active nucleus is found, neither a strong point source

nor dilution in CO stellar features, which are expected tracers of AGN activity. Even if no AGN traces are detected in the near-IR, with the currently available data it is still not possible to establish whether the bolometric luminosity of the object is powered by the AGN or by the starburst: we demonstrate that the two scenarios constitute equally viable alternatives. However, the absence of any signature other than in the hard X-rays implies that, in both scenarios, the AGN is non-standard: if it dominates, it must be obscured in all directions, conversely, if the starburst dominates, the AGN must lack UV photons with respect to X-rays. An important conclusion is that powerful AGNs can be hidden even at mid-infrared wavelengths and, therefore, the nature of luminous dusty galaxies cannot be always characterized by long-wavelength data alone but must be complemented with sensitive hard X-ray observations.

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A strong jet/cloud interaction in the Seyfert galaxy IC 5063: VLBI observations

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We present 21-cm HI line and 13-cm continuum observations, obtained with the Australian Long Baseline Array, of the Seyfert 2 galaxy IC 5063. This object appears to be one of the best examples of Seyfert galaxies where shocks produced by the radio plasma jet influence both the radio as well as the near-infrared emission. The picture resulting from the new observations of IC 5063 confirms and completes the one derived from previous Australia Telescope Compact Array (ATCA) lower resolution observations. A strong interaction between the radio plasma ejected from the nucleus and a molecular cloud of the ISM is occurring at the position of the western hot spot, about 0.6 kpc from the active nucleus. Because of this interaction, the gas is swept up forming, around the radio lobe, a cocoon-like structure where the gas is moving at high speed. Due to this, part of the molecular gas is dissociated and becomes neutral or even ionised if the UV continuum produced by the shocks is hard and powerful enough.

In the 21-cm HI line new data, we detect only part of the strong blue-shifted HI absorption that was previously observed with the ATCA at lower resolution. In particular, the main component detected in the VLBI absorption profile corresponds to the most blue-shifted component in the ATCA data, with a central velocity of 2786 km/s and therefore blue-shifted $\sim$ 614 km/s with respect to the systemic velocity. Its peak optical depth is 5.4%. The corresponding column density of the detected absorption, for a spin temperature of 100 K, is $N_{\rm HI} \sim 2 \times 10^{21}$atoms cm^{-2}. Most of the remaining blue-shifted components detected in the ATCA HI absorption profile are now undetected, presumably because this absorption occurs against continuum emission that is resolved out in these high-resolution observations.

The HI absorption properties observed in IC 5063 appear different from those observed in other Seyfert galaxies, where the HI absorption detected is attributed to undisturbed foreground gas associated with the large-scale galaxy disk. In the case of IC 5063, only a small fraction of the absorption can perhaps be due to this. The reason for this can be that the western jet in IC 5063 passes through a particularly rich ISM. Alternatively, because of the relatively strong radio flux produced by this strong interaction, and the high spectral dynamic range of our observations, broad absorption lines of low optical depth as detected in IC 5063 may have remained undetected in other Seyferts that are typically much weaker radio emitters or for which existing data is of poorer quality

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Optical, near-infrared and hard X–ray observations of SAXJ 1353.9+1820: a red quasar

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We present the results of a follow–up *ASCA* observation and multicolour optical and near-infrared photometry carried out at the 3.5-m Italian National Telescope Galileo of SAXJ 1353.9+1820. This object, serendipitously discovered by *BeppoSAX* in the 5–10 keV band, has been spectroscopically identified as a red quasar at z=0.217. The combined X–ray and optical–infrared data reveal the presence of a moderately luminous X–ray source ($\sim 10^{44}$ erg s^{-1}) obscured by a column density of the order of 10^{22} cm^{-2} in a otherwise optically passive early-type galaxy. The implications for the nature of red quasars and their possible contribution to the hard X–ray background are briefly outlined.

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X-ray absorption lines in the Seyfert 1 galaxy NGC 5548 discovered with *Chandra*-LETGS

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We present for the first time a high-resolution X-ray spectrum of a Seyfert galaxy. The Chandra-LETGS spectrum of NGC 5548 shows strong, narrow absorption lines from highly ionised species (the H-like and He-like ions of C, N, O, Ne, Na, Mg, Si, as well as Fe XIV–XXI). The lines are blueshifted by a few hundred km/s. The corresponding continuum absorption edges are weak or absent. The absorbing medium can be modelled by an outflowing, thin and warm shell in photoionization equilibrium. The absorption lines are similar to lower ionization absorption lines observed in the UV, although these UV lines originate from a different location or phase of the absorbing medium. Redshifted with respect to the absorption lines, emission from the O VIII Lyman alpha line as well as the O VII triplet is visible. The flux of these lines is consistent with emission from the absorbing medium. The O VII triplet intensity ratios demonstrate that photoionization dominates and yield an upper limit to the electron density.

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Narrow-band imaging of Seyfert galaxies

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We present narrow-band emission line (Hα + [N II] $\lambda\lambda$6548, 6583, [O III] $\lambda\lambda$4959, 5007) as well as green or red continuum images of selected Seyfert galaxies. The sample includes NGC 7214, IC 4218, Akn 479, Mrk 915, IC 1515 and F 348.

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The Variability of Seyfert 1.8 and 1.9 Galaxies at 1.6 microns

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We present a study of Seyfert 1.5-2.0 galaxies observed at two epochs with the Hubble Space Telescope (HST) at 1.6 microns. We find that unresolved nuclear emission from 9 of 14 nuclei varies at the level of 10-40% on timescales of 0.7-14 months, depending upon the galaxy. A control sample of Seyfert galaxies lacking unresolved sources and galaxies lacking Seyfert nuclei show less than 3% instrumental variation in equivalent aperture measurements. This proves that the unresolved sources are non-stellar and associated with the central pc of active galactic nuclei. Unresolved sources in Seyfert 1.8 and 1.9 galaxies are not usually detected in HST optical surveys, however high angular resolution infrared observations will provide a way to measure time delays in these galaxies.

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X-ray observation of the super-luminal quasar 4C+73.18 (1928+738) by ASCA

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The results of an X-ray observation of the nearby core-dominated, super-luminal quasar 4C+73.18 (1928+738) with ASCA are reported. Variations of the 1-10keV flux on time-scales of the order of 10 hours were found while the 0.5–1keV flux remained almost unchanged. The quasar shows a curved spectrum in the 0.8–10keV band, which can be modeled as a power law plus a soft component. Both, the spectrum and the uncorrelated flux variations indicate the presence of a soft X-ray excess, which might be the high-energy extension of the intense UV bump emission found in this quasar. The hard X-ray emission is dominated by the flat power law (photon index 1.1–1.5). The results are consistent with models in which the hard X-rays are emitted from the relativistic jet. An iron line emission as reported in a previous Ginga observation (Lawson & Turner 1997) was not detected. We suggest that the line detected by Ginga is not associated with the quasar. There are indications for a tentative weak emission line-like feature around 1.25keV (1.63keV in the quasar frame) in both, the SIS and GIS spectra. The energy is surprisingly close to that of an unexplained line found in the flat-spectrum quasar PKS0637-752 by Yaqoob et al. (1998).

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RBSC-NVSS Sample. I. Radio and optical identifications of a complete sample of 1500 bright X-ray sources

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We cross-identified the *ROSAT* Bright Source Catalog (RBSC) and the NRAO VLA Sky Survey (NVSS) to construct the RBSC-NVSS sample of the brightest X-ray sources (≥ 0.1 counts $\mathrm{s}^{-1} \sim 10^{-12}$ ergs cm^{-2} s^{-1} in the 0.1–2.4 keV band) that are also radio sources ($S \geq 2.5$ mJy at 1.4 GHz) in the 7.8 sr of extragalactic sky with $|b| > 15°$ and $\delta > -40°$. The sky density of NVSS sources is low enough that they can be reliably identified with RBSC sources having rms positional uncertainties $\geq 10''$. We used the more accurate radio positions to make reliable X-ray/radio/optical identifications down to the POSS plate limits. We obtained optical spectra for many of the bright identifications lacking published redshifts. The resulting X-ray/radio sample is unique in its size ($N \sim 1500$ objects), composition (a mixture of nearly normal galaxies, Seyfert galaxies, quasars, and clusters), and low average redshift ($\langle z \rangle \sim 0.1$).

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Announcement

2MASS Second Incremental Data Release

The Two Micron All Sky Survey (2MASS) Second Incremental Data Release is now available for public access. This Release includes data from the northern and southern 2MASS facilities, covering 47The Release data products consist of a Point Source Catalog containing positions and photometry for over 162 million objects, an Extended Source Catalog containing positions, photometry and basic shape information for over 585,000 resolved sources, approximately 1.9 million compressed 512x1024 pixel (1"/pixel) images in the three Survey bandpasses, and non-compressed "postage-stamp" images for all of the Extended Source Catalog objects.

The release data products can be accessed on-line from the IPAC/2MASS Web site at http://www.ipac.caltech.edu/2mass/ or directly from the NASA/Infrared Science Archive site at http://irsa.ipac.caltech.edu/. In the near future, the release Catalogs will be available via ftp download, and on a limited distribution DVD-ROM. Access to the 2MASS Atlas Images is currently possible only via the on-line services.

The 2MASS/IPAC webpage contains general information about this data release, including an on-line Explanatory Supplement (http://www.ipac.caltech.edu/2mass/releases/second/doc/explsup.html), sky coverage maps, images of interesting objects in the release, catalog characteristics, etc. A tool for determining whether a specified position is included in the release area is available on the NASA/Infrared Science Archive webpage. Questions about the release can be directed to the 2MASS Help Desk at 2mass@ipac.caltech.edu.

We encourage you to notify us (at 2mass@ipac.caltech.edu) about any refereed publications or conference proceedings (even in preprint form) which make use of these or earlier 2MASS Release data products. We will gladly provide links to your papers from the 2MASS website. Thank you very much in advance.

The 2MASS Project

The Two Micron All Sky Survey is a joint project of the University of Massachusetts and the Infrared Processing and Analysis Center/California Institute of Technology. Funding for the survey has been provided by the National Aeronautics and Space Administration and the National Science Foundation.

The Active Galaxies Newsletter is available on the World Wide Web. You can access it via the University of Manchester home page :- http://www.ast.man.ac.uk/∼mpr/agn/