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Accepted Abstracts - Submitted Abstracts - Thesis Abstracts
Jobs Adverts - Meetings Adverts - Special Announcements

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.

IMPORTANT CHANGES TO THE NEWSLETTER

Please note that the web & email addresses for the Active Galaxies Newsletter has changed.

THE NEW EMAIL ADDRESS IS: agnews@manchester.ac.uk

THE WEB-PAGE ADDRESS IS: http://www.manchester.ac.uk/jodrellbank/∼agnews

As always as editor of the newsletter I am very interested to hear any suggestions or feedback regarding the newsletter. So do not hesitate in emailing me your suggestions.

Many thanks for your continued subscription.

Rob Beswick

Abstracts of recently accepted papers

The first detection of near-infrared CN bands in active galactic nuclei: signature of star formation

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We present the first detection of the near-infrared CN absorption band in the nuclear spectra of active galactic nuclei (AGN). This feature is a recent star formation tracer, being particularly strong in carbon stars. The equivalent width of the CN line correlates with that of the CO at 2.3 μm, as expected in stellar populations (SP) with ages between $\sim$0.2 and $\sim$2 Gyr. The presence of the 1.1μm CN band in the spectra of the sources is taken as an unambiguous evidence of the presence of

young/intermediate SP close to the central source of the AGN. Near-infrared bands can be powerful age indicators for star formation connected to AGN, the understanding of which is crucial in the context of galaxy formation and AGN feedback.

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Models for jet power in elliptical galaxies: A case for rapidly spinning black holes

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The power of jets from black holes are expected to depend on both the spin of the black hole and the structure of the accretion disk in the region of the last stable orbit. We investigate these dependencies using two different physical models for the jet power: the classical Blandford-Znajek (BZ) model and a hybrid model developed by Meier (2001). In the BZ case, the jets are powered by magnetic fields directly threading the spinning black hole while in the hybrid model, the jet energy is extracted from both the accretion disk as well as the black hole via magnetic fields anchored to the accretion flow inside and outside the hole's ergosphere. The hybrid model takes advantage of the strengths of both the Blandford-Payne and BZ mechanisms, while avoiding the more controversial features of the latter. We develop these models more fully to account for general relativistic effects and to focus on advection-dominated accretion flows (ADAF) for which the jet power is expected to be a significant fraction of the accreted rest mass energy.

We apply the models to elliptical galaxies, in order to see if these models can explain the observed correlation between the Bondi accretion rates and the total jet powers. For typical values of the disk viscosity parameter $\alpha \sim 0.04 - 0.3$ and mass accretion rates consistent with ADAF model expectations, we find that the observed correlation requires $j \gtrsim 0.9$; i.e., it implies that the black holes are rapidly spinning. Our results suggest that the central black holes in the cores of clusters of galaxies must be rapidly rotating in order to drive jets powerful enough to heat the intracluster medium and quench cooling flows.

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Low-Luminosity Active Galactic Nuclei: Are They UV-Faint and Radio Loud?

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Low-luminosity active galactic nuclei (AGNs) are perceived to be radio loud and devoid of a "big blue bump", indicating a transition from a radiatively efficient, geometrically thin, accretion disc in high-luminosity AGNs, to a geometrically thick, radiatively inefficient accretion flow at low luminosities and accretion rates. I revisit the issue of the spectral energy distributions (SEDs) of low-luminosity AGNs using recently published, high-angular-resolution data at radio, ultraviolet (UV), and X-ray wavelengths, for a sample of 13 nearby galaxies with low-ionization nuclear emission-line region (LINER) nuclei. I show that, contrary to common wisdom, low-luminosity LINERs have significant nonstellar UV flux, and UV/X-ray luminosity ratios similar, on average, to those of Seyfert 1 nuclei $\sim 10^4$ times more luminous. The α_{ox} index that quantifies this ratio is in the range between -0.8 to -1.4, and is below the extrapolation to low luminosities of the relation between α_{ox} and UV luminosity observed at higher luminosities. In terms of radio loudness, most of the LINERs are indeed radio loud (or sometimes even "super radio loud") based on their radio/UV luminosity ratios, when compared to the most luminous quasars. However, the entire distribution of radio loudness has been shown to shift to higher radio/UV ratios at low AGN luminosities. In the context of this global shift, some LINERs (the majority) can be considered radio quiet, and some (from among those with black hole masses $> 10^{8.5} M_\odot$) are radio loud. The SEDs of these low-luminosity ($\sim 10^{40}$ erg s^{-1}) AGNs are thus quite similar to those of Seyferts up to luminosities of $\sim 10^{44}$ erg s^{-1}, and there is no evidence for a sharp change in the SED at the lowest luminosities. Thin AGN accretion discs may therefore persist at low accretion rates, in analogy to some recent findings for Galactic stellar-mass accreting black holes.

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Optical Line Diagnostics of $z \approx 2$ Optically Faint Ultra-Luminous Infrared Galaxies in the *Spitzer* Boötes Survey

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We present near-infrared spectroscopic observations for a sample of ten optically faint luminous infrared galaxies ($R-[24] \geq 14$) using Keck NIRSPEC and Gemini NIRI. The sample is selected from a 24 μm *Spitzer* MIPS imaging survey of the NDWFS Boötes field. We measure accurate redshifts in the range $1.3 \lesssim z \lesssim 3.4$. Based on either emission line widths or line diagnostics, we find that all ten galaxies harbor luminous AGN. Seven sources are type I AGN, exhibiting broad (>1900 km s^{-1}) Hα or Hβ emission lines; the remaining three are type II AGN. Given their large mid-IR luminosities and faint optical magnitudes, we might expect these sources to be heavily extincted quasars, and therefore only visible as type II AGN. The visibility of broad lines in 70% of the sources suggests that it is unlikely that these AGN are being viewed through the mid-plane of a dusty torus. For four of the sources we constrain the Hα/Hβ Balmer decrement and estimate the extinction to the emission line region to be large for both type I and type II AGN, with $A_{\rm H\alpha} \gtrsim 2.4 - 5$ mag. Since the narrow-line region is also extincted and the UV continuum emission from the host galaxies is extremely faint, this suggests that much of the obscuration is contributed by dust on large ($\sim$kpc) scales within the host galaxies. These sources may be examples of "host-obscured" AGN which could have space densities comparable or greater to that of optically luminous type I AGN with similar bolometric luminosities.

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The Masses of Black Holes in Active Galactic Nuclei

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Reverberation mapping methods have been used to measure masses in about three dozen AGNs. The consistency of the virial masses computed from line widths and time delays, the relationship between black hole mass and host-galaxy stellar bulge velocity dispersion, and the consistency with black hole masses estimated from stellar dynamics in the two cases in which such determinations are possible all indicate that reverberation mass measurements are robust and are accurate to typically a factor of a few. The reverberation-mapped AGNs are of particular importance because they anchor the scaling relationships that allow black hole mass estimation based on single spectra. We discuss potential sources of systematic error, particularly with regard to how the emission line widths are measured.

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Dressing a naked quasar: star formation and AGN feedback in HE0450-2958

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We present Australia Telescope Compact Array radio continuum observations of the quasar/galaxy system HE0450−2958. An asymetric triple linear morphology is ob served, with the central radio component coincident with the quasar core and a s econd radio component associated with a companion galaxy at a projected distance of 7 kpc from the quasar. The system obeys the

far-infrared to radio continuum correlation, implying the radio emission is energetically dominated by star for mation activity. However, there is undoubtedly some contribution to the overall radio emission from a low-luminosity AGN core and a pair of radio lobes. Long ba seline radio interferometric observations of the quasar core place a 3σ u pper limit of 0.6 mJy at 1400 MHz on the AGN contribution to the quasar's radi o emission; less than 30% of the total. The remaining 70% of the radio emissio n from the quasar is associated with star formation activity and provides the fi rst direct evidence for the quasar's host galaxy. A re-anlaysis of the VLT spect roscopic data shows extended emission line regions aligned with the radio axis a nd extended on scales of ∼20 kpc. This is interpreted as evidence for jet- cloud interactions, similar to those observed in radio galaxies and Seyferts. Th e emission lines in the companion galaxy are consistent with radiative shocks an d its spatial association with the eastern radio lobe implies large-scale jet-in duced star formation has played a role in this galaxy's evolution.

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On the Iwasawa-Taniguchi effect of radio-quiet AGN

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The existence of an anti-correlation between the Equivalent Width (EW) of the neutral narrow core of the iron Kα emission line and the 2–10 keV luminosity (the so-called 'X-ray Baldwin' or 'Iwasawa-Taniguchi' effect) has been debated in the last years. We aim at testing this claim on the largest catalogue of radio quiet AGN high-quality X-ray spectra ever published.

The final sample comprises 157 objects. We search for a relation of the iron line EW not only with the X-ray luminosity, but also with the Black Hole mass, the Eddington ratio and the cosmological distance. The data presented here were analyzed homogeneously, all spectra are from the same instrument and with high Signal-to-Noise Ratio.

A linear censored fit on the EW versus 2–10 keV luminosity is highly significant and yields $\log(EW_{Fe}) = (1.73 \pm 0.03) + (-0.17 \pm 0.03)\log(L_{X,44})$, where EW_{Fe} is the EW of the neutral iron Kα line in eV and $L_{x,44}$ is the 2-10 keV X-ray luminosity in units of 10^{44} erg s^{-1}. The anti-correlation with the Eddington ratio is also very significant, while no dependence of the iron EW on the BH mass is apparent.

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A longer XMM-Newton look at I Zwicky 1: variability of the X-ray continuum, absorption, and iron Kα line

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We present the second *XMM-Newton* observation (85 ks) of the narrow-line Seyfert 1 galaxy (NLS1) I Zw 1 and describe its mean spectral and timing characteristics. On average, I Zw 1 is ~ 35 per cent dimmer in 2005 than in the shorter (20 ks) 2002 observation. Between the two epochs the intrinsic absorption column density diminished, but there were also subtle changes in the continuum shape. Considering the blurred ionised reflection model, the long-term changes can be associated with a varying contribution of the power law component relative to the total spectrum. Examination of normalised light curves indicates that the high-energy variations are quite structured and that there are delays, but only in some parts of the light curve. Interestingly, a hard X-ray lag first appears during the most-distinct structure in the mean light curve, a flux dip ~ 25 ks into the observation. The previously discovered broad, ionised Fe Kα line shows significant variations over the course of the 2005 observation. The amplitude of the variations is $25-45$ per cent and they are unlikely due to changes in the Fe Kα-producing region, but perhaps arise from orbital motion around the black hole or obscuration in the broad iron line-emitting region. The 2002 data are re-examined for variability of the Fe Kα line at that epoch. There is evidence of energy and flux variations that are associated with a hard X-ray flare that occurred during that observation.

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A longer XMM-Newton look at I Zwicky 1: physical conditions and variability of the ionised absorbers

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We present a spectral analysis of the narrow-line Seyfert 1 galaxy I Zwicky 1, focusing on the characteristics of the ionised absorbers as observed with *XMM-Newton* in 2005. The soft X-ray spectrum shows absorption by two components of ionised gas with a similar column density ($N_H \sim 10^{21}$ cm^{-2}) and ionisation parameters log$\xi \sim 0$ and 2.5. Comparing this observation with a 2002 *XMM-Newton* data set, we see a clear anti-correlation between the X-ray ionisation parameter ξ_X and the 0.1–10 keV luminosity. Viable explanations for this effect include transient clouds or filaments crossing the line of sight in a complex geometry or a gas observed in non-equilibrium. The outflow velocity of the X-ray low-ionisation absorber is consistent with the outflow of the UV absorber detected in a past Hubble Space Telescope observation. In addition, the ionic column densities of CIV and NV derived from the X-ray model are consistent with the UV values. This suggests that the low-ionisation outflowing gas may survive for many years, despite large changes in flux, and that there is a tight connection between the X-ray and UV absorbers that can only be confirmed with a simultaneous UV and X-ray observation.

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A longer XMM-Newton look at I Zwicky 1: distinct modes of X-ray spectral variability

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The short-term spectral variability of the narrow-line Seyfert 1 galaxy I Zwicky 1 (I Zw 1) as observed in an 85 ks *XMM-Newton* observation is discussed in detail. I Zw 1 shows distinct modes of variability prior to and after a flux dip in the broad-band light curve. Before the dip the variability can be described as arising from changes in shape and normalisation of the spectral components. Only changes in normalisation are manifested after the dip. The change in the mode of behaviour occurs on dynamically short timescales in I Zw 1. The data suggest that the accretion-disc corona in I Zw 1 could have two components that are co-existing. The first, a uniform, physically diffuse plasma responsible for the "typical" long-term (e.g. years) behaviour; and a second compact, centrally located component causing the rapid flux and spectral changes. This compact component could be the base of a short or aborted jet as sometimes proposed for radio-quiet active galaxies. Modelling of the average and time-resolved rms spectra demonstrate that a blurred Compton-reflection model can describe the spectral variability if we allow for pivoting of the continuum component prior to the dip.

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Adaptive Optics Discovery of Supernova 2004ip in the Nuclear Regions of the Luminous Infrared Galaxy IRAS 18293-3413

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We report a supernova discovery in Ks-band images from the NAOS CONICA adaptive optics (AO) system on the ESO Very Large Telescope (VLT). The images were obtained as part of a near-infrared search for highly-obscured supernovae in the nuclear regions of luminous and ultraluminous infrared galaxies. SN 2004ip is located within a circumnuclear starburst at 1.4 arcsec (or 500 pc) projected distance from the K-band nucleus of the luminous infrared galaxy IRAS 18293-3413. The supernova luminosity and light curve are consistent with a core-collapse event suffering from a host galaxy extinction of up to about 40 magnitudes in V-band which is as expected for a circumnuclear starburst environment. This is the first supernova to be discovered making use of AO correction and demonstrates the potential of the current 8-meter class telescopes equipped with AO in discovering supernovae from the innermost nuclear regions of luminous and ultraluminous infrared galaxies.

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Obscured and unobscured AGN populations in a hard-X-ray selected sample of the XMDS survey

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Aims: Our goal is to probe the populations of obscured and unobscured AGN investigating their optical-IR and X-ray properties as a function of X-ray flux, luminosity and redshift within a hard X-ray selected sample with wide multiwavelength coverage.
Methods: We selected a sample of 136 X-ray sources detected at a significance of $\geq 3\sigma$ in the $2-10$ keV band ($F_{2-10} \geq 10^{-14}$ erg cm^{-2} s^{-1}) in a ~ 1 deg^2 area in the XMM Medium Deep Survey (XMDS). The XMDS area is covered with optical photometry from the VVDS and CFHTLS surveys and infrared Spitzer data from the SWIRE survey. Based on the X-ray luminosity and X-ray to optical ratio, 132 sources are likely AGN, of which 122 have unambiguous optical - IR identification. The observed optical and IR spectral energy distributions of all identified sources are fitted with AGN/galaxy templates in order to classify them and compute photometric redshifts. X-ray spectral analysis is performed individually for sources with a sufficient number of counts and using a stacking technique for subsamples of sources at different flux levels. Hardness ratios are used to estimate X-ray absorption in individual weak sources.
Results: 70% of the AGN are fitted by a type 2 AGN or a star forming galaxy template. We group them together in a single class of "optically obscured" AGN. These have "red" optical colors and in about 60% of cases show significant X-ray absorption ($N_H > 10^{22}$ cm^{-2}). Sources with SEDs typical of type 1 AGN have "blue" optical colors and exhibit X-ray absorption in about 30% of cases. The stacked X-ray spectrum of obscured AGN is flatter than that of type 1 AGN and has an average spectral

slope of $\Gamma = 1.6$. The subsample of objects fitted by a star forming galaxy template has an even harder stacked spectrum, with $\Gamma \sim 1.2 - 1.3$. The obscured fraction is larger at lower fluxes, lower redshifts and lower luminosities. X-ray absorption is less common than "optical" obscuration and its incidence is nearly constant with redshift and luminosity. This implies that at high luminosities X-ray absorption is not necessarily related to optical obscuration. The estimated surface densities of obscured, unobscured AGN and type 2 QSOs are respectively 138, 59 and 35 deg^{-2} at $F > 10^{-14}$ erg cm^{-2} s^{-1}.

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XMM-Newton broad-band observations of NGC 7582: N_H variations and fading out of the active nucleus

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We present results from two XMM–Newton observations of the bright classical Seyfert 2 galaxy NGC 7582 taken four years apart (2001 May and 2005 April). We present the analysis of the high-resolution (0.3-1 keV) RGS and low-resolution (0.3-10 keV) EPIC spectroscopic data. A comparison with a 1998 BeppoSAX observation suggests that XMM–Newton caught the source in a "reflection-dominated" phase, measuring the lowest continuum flux level ever ($F_{2-10} = 2.3 \times 10^{-12}$ erg cm^{-2} s^{-1}) in 2005. NGC 7582 therefore experienced a dramatic spectral transition most likely due to the partial switching-off of the nuclear activity. The XMM-Newton spectrum of the continuum emission is very complex. It can be well described by a model consisting of a combination of a heavily absorbed ($N_H \sim 10^{24}$ cm^{-2}) power law and a pure reflection component both obscured by a column density of $\sim 4 \times 10^{22}$ cm^{-2}. Notably, we detect a significant increase by a factor of ~ 2 in the column density of the inner, thicker absorber covering the primary X-ray source between 2001 and 2005. The 2005 XMM–Newton spectrum shows the strongest Fe Kα emission line ever measured in this source. This is consistent with the line delayed time response to the decrease of the nuclear activity. Our analysis also reveals that the soft X-ray spectrum is dominated by emission lines from highly ionized metals. The detection of a narrow OVIII radiative recombination continuum suggests an origin in a photoionized plasma.

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Observations of OI and CaII Emission Lines in Quasars: Implications for the Site of FeII Line Emission

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We present results of the near-infrared (IR) spectroscopy of six quasars whose redshifts ranging from 0.158 to 1.084. Combined with the satellite ultraviolet data, it is given the relative line strengths of OI λ1304, λ8446, and λ11287, and near-IR CaII triplet. In addition, corresponding OI line strengths measured in Seyfert 1s and narrow-line Seyfert 1s are collected from literature. These lines are thought to emerge from the same gas with FeII lines, so are good tracers of the FeII emission region within a broad-emission-line region (BELR) in active galactic nuclei. In order to reveal the physical condition within the relevant emission region, we performed photoionized model calculations and compared them to the observations. It suggests that a rather dense gas with density $n_H \sim 10^{11.5}$ cm^{-3} is present at an outer portion of the BELR, illuminated by the ionizing radiation corresponding to an ionization parameter $U \sim 10^{-2.5}$, and is dominantly responsible for the observed OI, CaII, and FeII lines based on the resemblance of their profiles. The three OI lines are proved to be formed through Lyβ fluorescence and collisional excitation. We also show that the λ1304 bump typically observed in AGN spectra consists of the comparable contributions of OI and SiII multiplets, and discuss the origin of such a strong SiII emission. The results are interpreted in the context of the locally optimally emitting cloud (LOC) scenario to find the most plausible distribution functions of the BELR

gas of distance from the central source and density.

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Revisiting the Black Hole Masses of Soft X-ray-Selected Active Galactic Nuclei

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In our previous work, using luminosity and the Hβ FWHM as surrogates for black hole mass ($M_{\rm BH}$), we compared the black hole masses of narrow-line Seyfert 1 galaxies (NLS1s) and broad-line Seyfert 1 galaxies (BLS1s) in a sample of soft X-ray-selected active galactic nuclei. We found that the distributions of black hole masses in the two populations are statistically different. Recent work shows that the second moment of the Hβ emission line (the line dispersion) is a better estimator of black hole mass than FWHM. To test whether changing the width measure affects our results, we calculate line dispersion-based black hole masses for our soft X-ray-selected sample. We find that using the line dispersion rather than the FWHM as a measure of the gas velocity shifts NLS1 and BLS1 virial product distributions closer together, but they remain distinct. On the $M_{\rm BH}$-σ_* plane, we find that using the line dispersion leaves NLS1s below the $M_{\rm BH}$-σ_* relation, but to a less significant degree than when FWHM is used to calculate black hole masses (the [O III] λ5007 FWHM is used as a surrogate for the bulge stellar velocity dispersion). The level of significance of our findings is such that we cannot draw firm conclusions on the location of the two samples on the $M_{\rm BH}$-σ_* plane. We are still left with two alternative scenarios: either (1) NLS1s lie below the $M_{\rm BH}$-σ_* relation indicating that their black hole masses are growing, or (2) NLS1s lie on the $M_{\rm BH}$-σ_* relation, so they preferentially reside in smaller mass, less luminous galaxies; the present data do not allow us to choose one over the other. More trustworthy stellar velocity dispersions and accurate black hole mass measurements with reverberation mapping are required for a firmer statement about the locus of NLS1s on the $M_{\rm BH}$-σ_* plane.

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The heating mechanism for the warm/cool dust in powerful, radio-loud AGN

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The uncertainty surrounding the nature of the heating mechanism for the dust that emits at mid- to far-IR (MFIR) wavelengths in active galaxies limits our understanding of the links between active galactic nuclei (AGN) and galaxy evolution, as well as our ability to interpret the prodigious infrared and sub-mm emission of some of the most distant galaxies in the Universe. Here we report deep *Spitzer* observations of a complete sample of powerful, intermediate redshift ($0.05 < z < 0.7$) radio galaxies and quasars. We show that AGN power, as traced by [OIII]λ5007 emission, is strongly correlated with both the mid-IR (24μm) and the far-IR (70μm) luminosities, however, with increased scatter in the 70μm correlation. A major cause of this increased scatter is a group of objects that falls above the main correlation and displays evidence for prodigious recent star formation activity at optical wavelengths, along with relatively cool MFIR colours. These results provide evidence that illumination by the AGN is the *primary* heating mechanism for the dust emitting at both 24 and 70μm, with starbursts dominating the heating of the cool dust in only 20 – 30% of objects. This implies that powerful AGN are not always accompanied by the type of luminous starbursts that are characteristic of the peak of activity in major gas-rich mergers.

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Meetings

FIRST ANNOUNCEMENT:
X-ray Grating Spectroscopy Workshop, Cambridge, MA
July 11-13, 2007

Website: `http://cxc.harvard.edu/xgratings07`

We are pleased to announce X-ray Grating Spectroscopy, a science workshop sponsored by the Chandra X -ray Center. We are eager for scientists working with complementary spectroscopy at any wavelength to join the fun. The workshop will be held July 11-13, 2007 in Cambridge, Massachusetts at the Sheraton Commander Hotel.

The Workshop webpage `http://cxc.harvard.edu/xgratings07` provides details, including invited speakers, accommodation information, and a link for Registration/Abstract Submission.

For contributed talks and poster presentations the **DEADLINE is Wednesday May 02, 2007** for both registration and abstract submission. A final registration/submission deadline (for poster presentations only) is Wednesday May 30, 2007. Please note that this is during the AAS meeting.

1 Workshop Goals

- review progress afforded by X-ray grating spectroscopy of extragalactic and galactic sources
- compare/contrast physical conditions, estimates of location, geometry and kinematics of X-ray emitters/absorbers, encompassing collisionally- and photo-excited gas across different source types
- review and compare available atomic data and codes
- provide a forum for discussion of: -controversial or unexpected new results -potential new strategies for Chandra/XMM grating observations

1.1 Scope of the Meeting

1.1.1 INCLUDE

- New high-resolution X-ray spectroscopy results from the latest observations of extragalactic and galactic sources
- Deep IGM studies
- Related medium-resolution X-ray spectroscopy results from current satellites
- Theoretical interpretations and modeling issues
- Spectroscopic studies in conjunction with other wavebands
- The future of X-ray spectroscopy

1.1.2 EXCLUDE

- Results and discussions based primarily on X-ray imaging or timing results

Jobs

PhD and Postdoctoral Position: Gamma-Ray studies of AGN Landessternwarte Heidelberg, Germany

The Landessternwarte Heidelberg (LSW) offers one PhD and one postdoctoral position in its High-Energy Astrophysics group. The team is involved in the Very High Energy Gamma-ray Experiment H.E.S.S. and AGN observing programs with INTEGRAL, SUZAKU, XMM, and Chandra. We are looking for a postdoctoral researcher interested in active participation in the H.E.S.S. project. H.E.S.S. is an array of atmospheric Cerenkov telescopes operated by the H.E.S.S. collaboration in Namibia. It is currently upgraded to a new phase which will include the world's largest ground based Cherenkov telescope. Heidelberg is one of the main astrophysics centres in Germany with five institutes involved in most fields of astrophysics and particle-astrophysics.

The team at the Landessternwarte coordinates the multifrequency programme of the H.E.S.S. collaboration. Candidates are invited to participate in multifrequency projects involving dedicated telescopes of LSW, participate in collaborative research with GLAST, and are encouraged to contribute to the multifrequency programme with own research projects.

Responsibilities for the postdoctoral position include participation in HESS data analysis and operations of the HESS MWL programme.

The current postdoctoral opening is for an initial period of two years with the possibility of an extension of up to four years.

We also offer a PhD fellowship in the AGN group. Prospective candidates must be eligible for being accepted in the doctoral programme of Heidelberg University. This position is for an initial period of one year, with the possibility of an extension.

More information about these positions can be obtained from Stefan Wagner, swagner@lsw.uni-heidelberg.de.

The deadline for the PhD positions is June 1, 2007; for the postdoc position review of applications will begin on May 1, 2007 and will continue until the position is filled. Applications (including a CV, list of publication, description of accomplishments and research interests as well as contact information for 3 references) should be sent to Prof. S. Wagner, Landessternwarte Heidelberg, email: swagner@lsw.uni-heidelberg.de

For more details about these positions see http://www.lsw.uni-heidelberg.de/projects/hess/hess.phtml.

The Active Galaxies Newsletter is available on the World Wide Web. You can access it via the University of Manchester home page :- http://www.manchester.ac.uk/jodrellbank/∼agnews
If you move or your e-mail address changes, please send the editor your new address. If the Newsletter repeatedly bounces back from an address then that address is deleted from the mailing list.