Active Galaxies Newsletter	*An electronic publication dedicated to the observation and theory of active galaxies*
No. 172 — JULY 2011	Editor: Melanie Gendre (agnews@manchester.ac.uk)

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From the Editor

The Active Galaxies Newsletter is produced monthly. The deadline for contributions is the last day 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.

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.

Melanie Gendre

Abstracts of recently accepted papers

Localised H I 21-cm absorption towards a double-lobed $z = 0.24$ radio galaxy

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We present the results of a mini-survey for associated H I 21-cm absorption at $z \leq 0.42$ with the Giant Metrewave Radio Telescope. Our targets are radio galaxies, selected on the basis that the $\lambda \approx 1216$ Å luminosities are below $L_{\rm UV} \sim 10^{23}$ W Hz^{-1}, above which there has never been a detection of 21-cm absorption. Of the three sources for which we obtained good data, two are unclassified active galactic nuclei (AGN) and one is type-2. Being a non-detection, the type-2 object is consistent with our previous result that 21-cm absorption in radio sources is not dictated by unified schemes of AGN. In the case of the detection, the absorption only occurs towards one of the two resolved radio lobes in PKS 1649–062. If the absorption is due to another intervening galaxy, or cool H I gas in the intergalactic medium, covering only the south-west lobe, then, being at the same redshift, this is likely to be gravitationally bound to the optical object identified as PKS 1649–062. If the absorption is due to an inclined disk centred between the lobes, intervening the SW lobe while being located behind the NE lobe, by assuming that it covers the emission peak at ≈ 150 kpc from the nucleus, we estimate a dynamical mass of $\approx 3 \times 10^{12}$ $M_\odot$ for the disk.

Accepted by MNRAS Letters

E-mail contact: sjc@phys.unsw.edu.au,
preprint available at http://arxiv.org/abs/1103.2595

On the absence of molecular absorption in high redshift millimetre-band searches

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We have undertaken a search for millimetre-wave band absorption (through the CO and HCO^+ rotational transitions) in the host galaxies of reddened radio sources ($z = 0.405 - 1.802$). Despite the colour selection (optical–near infrared colours of $V - K \gtrsim 5$ in all but one source), no absorption was found in any of the eight quasars for which the background continuum flux was detected. On the basis of the previous (mostly intervening) H_2 and OH detections, the limits reached here and in some previous surveys should be deep enough to detect molecular absorption according to their $V - K$ colours. However, our survey makes the assumption that the reddening is associated with dust close to the emission redshift of the quasar and that the narrow millimetre component of this emission is intercepted by the compact molecular cores. By using the known millimetre absorbers to define the *colour depth* and comparing this with the ultra-violet luminosities of the sources, we find that, even *if* these assumptions are valid, only twelve of the forty objects (mainly from this work) are potentially detectable. This is assuming an excitation temperature of $T_{\rm x} = 10$ K at $z = 0$, with the number decreasing with increasing temperatures (to zero detectable at $T_{\rm x} \gtrsim 100$ K).

Accepted by MNRAS

E-mail contact: sjc@phys.unsw.edu.au,
preprint available at http://arxiv.org/abs/1106.0578

The X-ray properties of typical high-redshift radio-loud quasars

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We report spectral, imaging, and variability results from four new *XMM-Newton* observations and two new *C*handra observations of high-redshift ($z \geq 4$) radio-loud quasars (RLQs). Our targets span lower, and more representative, values of radio loudness than those of past samples of high-redshift RLQs studied in the X-ray regime. Our spectral analyses show power-law X-ray continua with a mean photon index, $\langle \Gamma \rangle = 1.74 \pm 0.11$, that is consistent with measurements of lower redshift RLQs. These continua are likely dominated by jet-linked X-ray emission, and they follow the expected anti-correlation between photon index and radio loudness. We find no evidence of iron Kα emission lines or Compton-reflection continua. Our data also constrain intrinsic X-ray absorption in these RLQs. We find evidence for significant absorption ($N_{\rm H} \approx 1.7 \times 10^{22}$ cm^{-2}) in one RLQ of our sample (SDSS J0011+1446); the incidence of X-ray absorption in our sample appears plausibly consistent with that for high-redshift RLQs that have higher values of radio loudness. In the *C*handra observation of PMN J221−2719 we detect apparent extended (~ 14 kpc) X-ray emission that is most likely due to a jet; the X-ray luminosity of this putative jet is $\approx 2\%$

that of the core. The analysis of a 4.9 GHz VLA image of PMN J221−2719 reveals a structure that matches the X-ray extension found in this source. We also find evidence for long-term (450–460 days) X-ray variability by 80–100% in two of our targets.

Accepted by Astrophysical Journal

E-mail contact: saez@astro.psu.edu,
preprint available at http://arxiv.org/abs/1106.2557

Uncovering the Spectral Energy Distribution in Active Galaxies Using High Ionization Mid-infrared Emission Lines

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The shape of the spectral energy distribution of active galaxies in the EUV–soft X-ray band (13.6 eV to 1 keV) is uncertain because obscuration by dust and gas can hamper our view of the continuum. To investigate the shape of the spectral energy distribution in this energy band, we have generated a set of photoionization models which reproduce the small dispersion found in correlations between high-ionization mid-infrared emission lines in a sample of hard X-ray selected AGN. Our calculations show that a broken power-law continuum model is sufficient to reproduce the [Ne V]$_{14.32\mu m}$/[Ne III], [Ne V]$_{24.32\mu m}$/[O IV]$_{25.89\mu m}$ and [O IV]$_{25.89\mu m}$/[Ne III] ratios, and does not require the addition of a "big bump" EUV model component. We constrain the EUV–soft X-ray slope, α_i, to be between 1.5 – 2.0 and derive a best fit of $\alpha_i \sim 1.9$ for Seyfert 1 galaxies, consistent with previous studies of intermediate redshift quasars. If we assume a blue bump model, most sources in our sample have derived temperatures between $T_{BB} = 10^{5.18}$ K to $10^{5.7}$ K, suggesting that the peak of this component spans a large range of energies extending from $\sim \lambda 600$ Å to $\lambda 1900$ Å. In this case, the best fitting peak energy that matches the mid-infrared line ratios of Seyfert 1 galaxies occurs between $\sim \lambda 700$–$\lambda 1000$ Å. Despite the fact that our results do not rule out the presence of an EUV bump, we conclude that our power-law model produces enough photons with energies > 4 Ry to generate the observed amount of mid-infrared emission in our sample of BAT AGN.

Accepted for publication in The Astrophysical Journal. 11 Figures.

E-mail contact: melendez@pha.jhu.edu,
preprint available at http://arxiv.org/abs/1106.0310

Time Variable Broad Line Emission in NGC 4203: Evidence for Stellar Contrails.

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Dual epoch spectroscopy of the lenticular galaxy, NGC 4203, obtained with the *Hubble Space Telescope* (*HST*) has revealed that the double-peaked component of the broad Hα emission line profile is time variable, increasing by a factor of 2.2 in brightness between 1999 and 2010 and is positively correlated with the line width. Modeling the gas distribution responsible for the double-peaked profiles indicates that a ring is a more appropriate description than a disk. Furthermore, both the ring diameter and the ring inclination increased significantly between the two observations. Consequently, the double-peaked broad emission lines most likely represent the contrails of two separate red supergiant stars that were tidally disrupted at a distance of $\sim$ 600 AU from the central black hole. There is also a bright core of broad Hα line emission that is not time variable and identified with a large scale inflow from an outer radius $\sim$ 1 pc. The electron temperature in the outer regions of the inflow is estimated using the [O III] emission line ratio and corresponds to $\leq$ 23,600 K with an associated gas density, inferred from the [S II] emission line ratio, of $1 \leq n$ (10^3 cm^{-3}) ≤ 6. The inflow, however, is characterized by a higher average gas density with n $\geq 10^4$ cm^{-3} leading to an inflow rate $\leq 6.9 \times 10^{-2}$ M$_\odot$/yr which exceeds the inflow requirement to explain the X-ray luminosity in terms of radiatively inefficient accretion by a factor of $\leq$18. The central AGN is unable to sustain ionization of the broad line region, the discrepancy is particularly acute in 2010 when the broad Hα emission line is dominated by the contrail of the second

in-falling supergiant star. However, ram pressure shock ionization produced by the in-falling supergiant may help alleviate the ionizing deficit by generating a mechanical source of ionization supplementing the photoionization provided by the AGN.

submitted to ApJ., June 23, 2011

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DRAFT is available at http://arxiv.org/abs/1106.4790

Meetings

AGN Winds in Charleston

Charleston, SC USA
October 15-18, 2011

Webpage: `http://chartasg.people.cofc.edu/winds4/winds/`
Email: `chartasg@cofc.edu`

The deadline for abstract submission and early registration at the above web site is August 15, 2011. The workshop is dedicated to the physical characteristics of AGN accretion disk winds - their structure, ionization state, kinematics, energetics, driving mechanism and their interaction with their environment.
Graduate students are encouraged to attend.