Active Galaxies Newsletter	*An electronic publication dedicated to the observation and theory of active galaxies*
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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.

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

A third H I 21-cm absorption system in the sight-line of MG J0414+0534: A redshift for Object X?

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We report the detection of a third H I 21-cm absorber in the sight-line towards the $z = 2.64$ quasar MG J0414+0534 (4C +05.19). In addition to the absorption at the host redshift and in the $z = 0.96$ gravitational lens, we find, through a decimetre-wave spectral scan towards this source, strong absorption at $z = 0.38$. We believe this may be associated with "Object X", an additional feature apparent in the field of the lensing galaxy and lensed images, on the basis of its close proximity to the quasar images and the possible detection of the [O III] doublet in a published optical spectrum. If real, the strength of the [O III] emission would suggest the presence of an active galactic nucleus, or a gas-rich galaxy undergoing rapid star formation, either of which is consistent with the strong outflows apparent in the 21-cm spectrum. Although this is the strongest intervening 21-cm absorber yet found (a column density of $N_{\rm HI} \gtrsim 10^{22}$ cm^{-2}, for a modest $T_{\rm s}/f \gtrsim 300$ K), simultaneous observations failed to detect any of the 18-cm OH lines at the 21-cm redshift. This suggests that, as for the lensing galaxy, this is not the primary location of the intervening material responsible for the very red colour of MG J0414+0534.

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E-mail contact: sjc@phys.unsw.edu.au,
preprint available at http://arxiv.org/abs/arXiv:1102.4910

The forbidden high ionisation line region of the type 2 quasar Q1131+16: a clear view of the inner face of the torus?

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We present spectroscopic observations of the type 2 quasar SDSS J11311.05+162739.5 (Q1131+16 hereafter; z=0.1732), which has the richest spectrum of forbidden high ionisation lines (FHIL, e.g. [Fe VII], [Fe X], [Fe XI] and [Ne V]) yet reported for an AGN, as well as unusually strong [O III]λ4363 emission. The study of this object provides a rare opportunity to investigate the physical conditions and kinematics of the region(s) emitting the FHILs. By comparison with photoionisation model results, we find that the FHIL region has high densities ($10^{5.5} < n_H < 10^{8.0}$ cm^{-3}) and ionisation parameters (-1.5 < log[U] < 0), yet its kinematics are similar to those of the low ionisation emission line region detected in the same object (FWHM $\sim$ 360±30 km/s), with no evidence for a significant shift between the velocity centroid of the FHILs and the rest frame of the host galaxy. The deduced physical conditions lie between those of the Broad-Line (n_H>10^9 cm^{-3}) and Narrow-Line Regions (n_H<10^6 cm^{-3}) of active galactic nuclei (AGN), and we demonstrate that the FHIL regions must be situated relatively close to the illuminating AGN ($0.32 < r_{FHIL} < 50$pc). We suggest that the inner torus wall is the most likely location for the FHIL region, and that the unusual strength of the FHILs in this object is due to a specific viewing angle of the far wall of the torus, coupled with a lack of dust on larger scales that might otherwise obscure our view of the torus.

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preprint available at http://arxiv.org/abs/1103.0660

Broad-Line Reverberation in the Kepler-Field Seyfert Galaxy Zw 229-015

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The Seyfert 1 galaxy Zw 229-015 is among the brightest active galaxies being monitored by the *Kepler* mission. In order to determine the black hole mass in Zw 229-015 from Hβ reverberation mapping, we have carried out nightly observations with the Kast Spectrograph at the Lick 3 m telescope during the dark runs from June through December 2010, obtaining 54 spectroscopic observations in total. We have also obtained nightly V-band imaging with the Katzman Automatic Imaging Telescope at Lick Observatory and with the 0.9 m telescope at the Brigham Young University West Mountain Observatory over the same period. We detect strong variability in the source, which exhibited more than a factor of 2 change in broad Hβ flux. From cross-correlation measurements, we find that the Hβ light curve has a rest-frame lag of $3.86^{+0.69}_{-0.90}$ days with respect to the V-band continuum variations. We also measure reverberation lags for Hα and Hγ and find an upper limit to the Hδ lag. Combining the Hβ lag measurement with a broad Hβ width of $\sigma = 1590 \pm 47$ km s^{-1} measured from the root-mean-square variability spectrum, we obtain a virial estimate of $M_{\rm BH} = 1.00^{+0.19}_{-0.24} \times 10^7\ M_\odot$ for the black hole in Zw 229-015. As a *Kepler* target, Zw 229-015 will eventually have one of the highest-quality optical light curves ever measured for any active galaxy, and the black hole mass determined from reverberation mapping will serve as a benchmark for testing relationships between black hole mass and continuum variability characteristics in active galactic nuclei.

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X-ray Characteristics of NGC 3516: A View through the Complex Absorber

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We consider new *Suzaku* data for NGC 3516 taken during 2009 along with other recent X-ray observations of the source. The cumulative characteristics of NGC 3516 cannot be explained without invoking changes in the line-of-sight absorption. Contrary to many other well-studied Seyfert galaxies, NGC 3516 does not show a positive lag of hard X-ray photons relative to soft photons over the timescales sampled. In the context of reverberation models for the X-ray lags, the lack of such a signal in NGC 3516 is consistent with flux variations being dominated by absorption changes. The lack of any reverberation signal in such a highly variable source disfavors intrinsic continuum variability in this case. Instead, the colorless flux variations observed at high flux states for NGC 3516 are suggested to be a consequence of Compton-thick clumps of gas crossing the line-of-sight.

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Broad-line active galactic nuclei rotate faster than narrow-line ones

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The super-massive black holes of 10^6 M$_\odot$ to 10^9 M$_\odot$ that reside in the nuclei of active galaxies (AGN) are surrounded by a region emitting broad lines, probably associated with an accretion disk. The diameters of the broad-line regions range from a few light-days to more than a hundred light-days, and cannot be resolved spatially. The relative significance of inflow, outflow, rotational or turbulent motions in the broad-line regions as well as their structure (spherical, thin or thick accretion disk) are unknown despite intensive studies over more than thirty years. Here we report a fundamental relation between the observed emission linewidth full-width at half-maximum (FWHM) and the emission line shape FWHM/σ_{line} in AGN spectra. From this relation we infer that the predominant motion in the broad-line regions is Keplerian rotation in combination with turbulence. The geometry of the inner region varies systematically with the rotation velocity: it is flattest for the fast-rotating broad-line objects, whereas slow-rotating narrow-line AGN have a more spherical structure. Superimposed is the trend that the line-emitting region becomes geometrically thicker towards the centre within individual galaxies. Knowing the rotational velocities, we can derive the central black-hole masses more accurately; they are two to ten times smaller than has been estimated previously.

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Integral Field Spectroscopy of Massive, Kiloparsec-Scale Outflows in the Infrared-Luminous QSO Mrk 231

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The QSO/merger Mrk 231 is arguably the nearest and best laboratory for studying QSO feedback. It hosts several outflows, including broad-line winds, radio jets, and a poorly-understood kpc scale outflow. In this Letter, we present integral field spectroscopy from the Gemini telescope that represent the first unambiguous detection of a wide-angle, kpc scale outflow from a powerful QSO. Using neutral gas absorption, we show that the nuclear region hosts an outflow with blueshifted velocities reaching 1100 $\mathrm{km\,s^{-1}}$, extending $2-3$ kpc from the nucleus in all directions in the plane of the sky. A radio jet impacts the outflow north of the nucleus, accelerating it to even higher velocities (up to 1400 $\mathrm{km\,s^{-1}}$). Finally, 3.5 kpc south of the nucleus, star formation is simultaneously powering an outflow that reaches more modest velocities of only 570 $\mathrm{km\,s^{-1}}$. Blueshifted ionized gas is also detected around the nucleus at lower velocities and smaller scales. The mass and energy flux from the outflow are $\gtrsim$2.5 times the star formation rate and $\gtrsim$0.7% of the AGN luminosity, consistent with negative feedback models of QSOs.

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preprint available at http://arxiv.org/abs/1102.4349

AKARI Detections of Hot Dust in Luminous Infrared Galaxies

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We present a new sample of active galactic nuclei (AGNs) identified using the catalog of the AKARI Mid-infrared(MIR) All-Sky Survey. Our MIR search has an advantage in detecting AGNs that are obscured at optical wavelengths due to extinction. We first selected AKARI 9micron excess sources with $F(9micron)/F(K_S) > 2$ where K_S magnitudes were taken from the Two Micron All Sky Survey. We then obtained follow-up near-infrared spectroscopy with the AKARI/IRC, to confirm that the excess is caused by hot dust. We also obtained optical spectroscopy with the Kast Double Spectrograph on the Shane 3-m telescope at Lick Observatory. On the basis of on these observations, we detected hot dust with a characteristic temperature of $\sim$500K in two luminous infrared galaxies. The hot dust is suspected to be associated with AGNs that exhibit their nonstellar activity not in the optical, but in the near- and mid-infrared bands, i.e., they harbor buried AGNs. The host galaxy stellar masses of $4-6\times10^9 M_{sun}$ are small compared with the hosts in optically-selected AGN populations. These objects were missed by previous surveys, demonstrating the power of the AKARI MIR All-Sky Survey to widen AGN searches to include more heavily obscured objects. The existence of multiple dusty star clusters with massive stars cannot be completely ruled out with our current data.

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preprint available at http://arxiv.org/abs/1103.2453

UV Continuum Color Variability of Luminous SDSS QSOs

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We examine whether the spectral energy distribution of UV continuum emission of active galactic nuclei (AGNs) changes during flux variation. We used multi-epoch photometric data of QSOs in the Stripe 82 observed by the Sloan Digital Sky Survey (SDSS) Legacy Survey and selected 10 bright QSOs observed with high photometric accuracies, in the redshift range of $z = 1.0 - 2.4$ where strong broad emission lines such as Lyα and C IV do not contaminate SDSS filters, to examine spectral variation of the UV continuum emission with broad-band photometries. All target QSOs showed clear flux variations during the monitoring period 1998−2007, and the multi-epoch flux data in two different bands obtained on the same night showed a linear flux-to-flux relationship for all target QSOs. Assigning the flux in the longer wavelength to the x-axis in the flux-to-flux diagram, the x-intercept of the best-fit linear regression line was positive for most targets, which means that their colors in the observing bands become bluer as they become brighter. Then, the host galaxy flux was estimated on the basis of the correlation between the stellar mass of the bulge of the host galaxy and the central black hole mass; the latter was estimated on the basis of the luminosity scaling relations for C IV or Mg II emission lines and their line width. We found that the longer wavelength flux of the host galaxy was systematically smaller than that of the fainter extension of the best-fit regression line at the same shorter wavelength flux for most targets. This result strongly indicates that the spectral shape of the continuum emission of QSOs in the UV region (∼1400−3600Å in rest-frame wavelength) usually becomes bluer as it becomes brighter. The multi-epoch flux data in the flux-to-flux diagram were found to be consistent with the wavelength-dependent amplitude of variation presented in Vanden Berk et al. (2004), which showed a larger amplitude of variation in shorter wavelengths. We also found that the multi-epoch flux-to-flux plots could be fitted well with the standard accretion disk model changing the mass accretion rate with a constant black hole mass for most targets. This finding strongly supports the standard accretion disk model for UV continuum emission of QSOs.

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preprint available at arXiv:1103.3619

Meetings

Dear colleagues,

We would like to announce a two-day workshop on AGN physics with CTA.

The workshop will take place on May 16th and 17th, 2011 in Toulouse,France, in connection with the general CTA meeting. Our intention is to open up the discussion of the potential impact of TeV astronomy with the CTA observatory to AGN experts from outside the consortium.

An outline of the programme and list of confirmed speakers can be found here:
http://cta.irap.omp.eu/toulouse2011 – "AGN workshop"
Propositions for contributed talks or posters are now accepted, registration will be open soon.

With our best regards,

Catherine Boisson, Hlne Sol, Andreas Zech
on behalf of the SOC

AGN physics in the CTA era

Workshop in Toulouse, May 16-17, 2011

SOC : M. Begelman, C. Boisson, G. Ghisellini, H. Krawczynski,
M. Punch, H. Sol, T. Totani, M. Urry, R. Wagner, M. Ward, A. Zech

With the start of its Preparatory Phase, a new step has been made towards the construction of CTA, the future large Cherenkov Telescope Array of ground-based gamma-ray astronomy. A two-day workshop devoted to "AGN physics in the CTA era" will be held in Toulouse, May 16th-17th 2011, in parallel to a general meeting of the CTA consortium. Combining reviews and contributed talks, the meeting will aim to present the current state of the art and to characterize future observing programmes for the various facets of AGN science at very high energies (VHE). Topics to be discussed include AGN population studies, particle acceleration and VHE emission models, variability studies, multiwavelength approach, EBL connection, VHE extended emission (radiogalaxies, pair haloes, diffuse background), passive black holes, primordial black holes ...