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

From the Editor

Welcome to all the new subscribers, and thanks to everyone who contributed to this issue of the Active Galaxies Newsletter. This newsletter is intended to disseminate paper abstracts, meeting announcements, job adverts and other information which may be of interest to the active galaxies community. It is produced monthly and, whilst the deadline for contributions is the last day of the month, contributions may be submitted at any time.

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. Please note that the editor may reject submissions which do not use the template. As always, any suggestions or feedback regarding the newsletter are welcome.

Many thanks for your continued subscription.

Megan Argo

Abstracts of recently accepted papers

SDSS J013127.34−032100.1: A newly discovered radio-loud quasar at $z = 5.18$ with extremely high luminosity

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Only very few $z > 5$ quasars discovered to date are radio-loud, with a radio-to-optical flux ratio (radio-loudness parameter) higher than 10. Here we report the discovery of an optically luminous radio-loud quasar, SDSS J013127.34−032100.1 (J0131−0321 in short), at $z = 5.18 \pm 0.01$ using the Lijiang 2.4m and Magellan telescopes. J0131−0321 has a spectral energy distribution consistent with that of radio-loud quasars. With an i-band magnitude of 18.47 and radio flux density of 33 mJy, its radio-loudness parameter is ~ 100. The optical and near-infrared spectra taken by Magellan enable us to estimate its bolometric luminosity to be $L_{\rm bol} \sim 1.1 \times 10^{48}$ erg s^{-1}, approximately 4.5 times greater than that of the most distant quasar known to date. The black hole mass of J0131−0321 is estimated to be $2.7 \times 10^9 M_\odot$, with an uncertainty up to 0.4 dex. Detailed physical properties of this high-redshift, radio-loud, potentially super-Eddington quasar can be probed in the future with more dedicated and intensive follow-up observations using multi-wavelength facilities.

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Preprint available at http://arxiv.org/abs/1410.2689

Recoiling Supermassive Black Holes: a search in the Nearby Universe

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The coalescence of a binary black hole can be accompanied by a large gravitational recoil due to anisotropic emission of gravitational waves. A recoiling supermassive black hole (SBH) can subsequently undergo long-lived oscillations in the potential well of its host galaxy, suggesting that offset SBHs may be common in the cores of massive ellipticals. We have analyzed HST archival images of 14 nearby core ellipticals, finding evidence for small ($\lesssim 10\,\mathrm{pc}$) displacements between the AGN (locating the SBH) and the center of the galaxy (the mean photocenter) in 10 of them. Excluding objects that may be affected by large-scale isophotal asymmetries, we consider six galaxies to have detected displacements, including M87, where a displacement was previously reported by Batcheldor et al. 2010. In individual objects, these displacements can be attributed to residual gravitational recoil oscillations following a major or minor merger within the last few Gyr. For plausible merger rates, however, there is a high probability of larger displacements than those observed, if SBH coalescence took place in these galaxies. Remarkably, the AGN-photocenter displacements are approximately aligned with the radio source axis in four of the six galaxies with displacements, including three of the four having relatively powerful kpc-scale jets. This suggests intrinsic asymmetries in radio jet power as a possible displacement mechanism, although approximate alignments are also expected for gravitational recoil. Orbital motion in SBH binaries and interactions with massive perturbers can produce the observed displacement amplitudes but do not offer a ready explanation for the alignments.

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Long-term X-ray stability and UV variability of the ionized absorption in NGC 3783

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We present the results of recent *Chandra* High-Energy Transmission Grating Spectrometer and *Hubble Space Telescope* Cosmic Origins Spectrograph observations of the nearby Seyfert 1 galaxy NGC 3783 which shows a strong, non-varying X-ray warm absorber and physically related and kinematically varying UV absorption. We compare our new observations to high-resolution, high signal-to-noise archival data from 2001, allowing a unique investigation into the long-term variations of the absorption over a 12 yr period. We find no statistically significant changes in the physical properties of the X-ray absorber, but there is a significant drop of $\sim 40\%$ in the UV and X-ray flux, and a significant flattening of the underlying X-ray power-law slope. Large kinematic changes are seen in the UV absorbers, possibly due to radial deceleration of the material. Similar behavior is not observed in the X-ray data, likely due to its lower velocity resolution, which shows an outflow velocity of $v_{\mathrm{out}} \sim -655\ \mathrm{km\,s^{-1}}$ in both epochs. The narrow iron Kα emission line at 6.4 keV shows no variation between epochs, and its measured width places the material producing the line at a radial distance of ~ 0.03 pc from the central black hole.

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Ultra-fast outflows in radio-loud active galactic nuclei

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Recent X-ray observations show absorbing winds with velocities up to mildly-relativistic values of the order of $\sim$0.1c in a limited sample of 6 broad-line radio galaxies. They are observed as blue-shifted Fe XXV–XXVI K-shell absorption lines, similarly to the ultra-fast outflows (UFOs) reported in Seyferts and quasars. In this work we extend the search for such Fe K absorption lines to a larger sample of 26 radio-loud AGNs observed with *XMM-Newton* and *Suzaku*. Combining the results of this analysis with those in the literature and correcting for the number of spectra with insufficient signal-to-noise, we find that the incidence of UFOs is conservatively of $f\simeq(50\pm20)\%$. This relatively high incidence indicates that either they are steady flows with a large covering fraction or that they are transient phenomena but fully covering the X-ray source. A photo-ionization modeling of the absorption lines with XSTAR allows to estimate the distribution of their main parameters. The observed outflow velocities are broadly distributed between $v_{\rm out}\lesssim$1,000 km s^{-1} and $v_{\rm out}\simeq$0.4c, with mean and median values of $v_{out}\simeq$0.133c and $v_{\rm out}\simeq$0.117c, respectively. The material is highly ionized, with an average ionization parameter of log$\xi\simeq$4.5 erg s^{-1} cm, and the column densities are larger than log$N_{\rm H}>$22 cm^{-2}. Overall, these characteristics are consistent with the presence of variable, clumpy accretion disk winds in a significant fraction of radio-loud AGNs and demonstrate that the presence of relativistic jets does not preclude the existence of winds, in accordance with several theoretical models.

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Preprint available at http://mnras.oxfordjournals.org/content/443/3/2154.full.pdf+html

The Narrow Line Region in 3D: mapping AGN feeding and feedback

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Early studies of nearby Seyfert galaxies have led to the picture that the Narrow Line Region (NLR) is a cone-shaped region of gas ionized by radiation from a nuclear source collimated by a dusty torus, where the gas is in outflow. In this contribution, I discuss a 3D view of the NLR obtained via Integral Field Spectroscopy, showing that: (1) although the region of highest emission is elongated (and in some cases cone-shaped), there is also lower level emission beyond the "ionization cone", indicating that the AGN radiation leaks through the torus; (2) besides outflows, the gas kinematics include also rotation in the galaxy plane and inflows; (3) in many cases the outflows are compact and restricted to the inner few 100pc; we argue that these may be early stages of an outflow that will evolve to an open-ended, cone-like one. Inflows are observed in ionized gas in LINERs, and in warm molecular gas in more luminous AGN, being usually found on hundred of pc scales. Mass outflow rates in ionized gas are of the order of a few solar masses per year, while the mass inflow rates are of the order of tenths of solar masses per year. Mass inflow rates in warm molecular gas are 4-5 orders of magnitude lower, but these inflows seem to be only tracers of more massive inflows in cold molecular gas that should be observable at mm wavelengths.

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Physical Conditions in the X-ray Emission-line Gas in NGC 1068

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We present a detailed, photoionization modeling analysis of *XMM-Newton*/Reflection Grating Spectrometer observations of the Seyfert 2 galaxy NGC 1068. The spectrum, previously analyzed by Kinkhabwala et al. (2002), reveals a myriad of soft-Xray emission lines, including those from H- and He-like carbon, nitrogen, oxygen, and neon, and M- and L-shell iron. As noted in the earlier analysis, based on the narrowness of the radiative recombination continua, the electron temperatures in the emission-line gas are consistent with photoionization, rather than collisional ionization. The strengths of the carbon and nitrogen emission lines, relative to those of oxygen, suggest unusual elemental abundances, which we attribute to star-formation history of the host galaxy. Overall, the emission-lines are blue-shifted with respect to systemic, with radial velocities ~ 160 km s^{-1}, similar to that of [O III] λ5007, and thus consistent with the kinematics and orientation of the optical emission-line gas and, hence, likely part of an AGN-driven outflow. We were able to achieve an acceptable fit to most of the strong emission-lines with a two-component photoionization model, generated with Cloudy. The two components have ionization parameters and column densities of log$U = -0.05$ and 1.22, and log$N_{\rm H} = 20.85$ and 21.2, and covering factors of 0.35 and 0.84, respectively. The total mass of the X-ray gas is roughly of an order of magnitude greater than the mass of ionized gas determined from optical and near-IR spectroscopy, which indicates that it may be the dominant component of the narrow line region. Furthermore, we suggest that the medium which produces the scattered/polarized optical emission in NGC 1068 possesses similar physical characteristics to those of the more highly-ionized of the X-ray model components.

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GTC Spectra of $z \approx 2.3$ Quasars: Comparison with Local Luminosity Analogues

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Context - The advent of 8-10m class telescopes makes possible for the first time detailed comparison of quasars with similar luminosity and very different redshifts.
Aims - A search for z-dependent gradients in line emission diagnostics and derived physical properties by comparing, in a narrow bolometric luminosity range ($\log L \sim 46.1\pm\ 0.4$ [erg s^{-1}]), some of the most luminous local $z < 0.6$ quasars with some of the lowest luminosity sources yet found at redshift $z = 2.1 - 2.5$.
Method - Moderate S/N spectra for 22 high redshift sources were obtained with the 10.4m Gran Telescopio Canarias (GTC) while the HST (largely Faint Object Spectrograph) archive provides a low redshift control sample. Comparison is made in the context of the 4D Eigenvector 1 formalism meaning that we divide both source samples into high accreting Population A and low accreting Population B sources.
Results - CIVλ1549, the strongest and most reliable diagnostic line, shows very similar properties at both redshifts confirming at high redshift the CIVλ1549 profile differences between Pop. A and B that are well established in local quasars. The CIVλ1549 blueshift that appears quasi-ubiquitous in higher L sources is found in only half (Population A) of quasars observed in both of our samples. A CIVλ1549 evolutionary Baldwin effect is certainly disfavored. We find evidence for lower metallicity in the GTC sample that may point toward a gradient with z. No evidence for a gradient in $M_{\rm BH}$ or $L/L_{\rm Edd}$ is found.
Conclusions - Spectroscopic differences established at low z are also present in much higher redshift quasars. Our results on the CIVλ1549 blueshift suggest that it depends on both source luminosity and $L/L_{\rm Edd}$. Given that our samples involve sources with very similar luminosity the evidence for a systematic metallicity decrease, if real, points toward an evolutionary effect. Our samples are not large enough to effectively constrain possible changes of $M_{\rm BH}$ or $L/L_{\rm Edd}$ with redshift. Both samples appear representative of a slow evolving quasar population likely present at all redshifts.

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A simplified view of blazars: the very high energy γ-ray vision

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We have recently proposed a simplified scenario for blazars in which these sources are classified as flat-spectrum radio quasars or BL Lacs according to the prescriptions of unified schemes, and to a varying combination of Doppler boosted radiation from the jet, emission from the accretion disk, the broad line region, and light from the host galaxy. This scenario has been thoroughly tested through detailed Monte Carlo simulations and reproduces all the main features of existing radio, X-ray, and γ-ray surveys. In this paper we consider the case of very high energy emission ($E > 100$ GeV) extrapolating from the expectations for the GeV band, which are in full accordance with the *Fermi*-LAT survey results, and make detailed predictions for current and future Cherenkov facilities, including the Cherenkov Telescope Array. Our results imply that $\gtrsim 100$ new blazars can be detected now at very high energy and up to $z \sim 1$, consistently with the very recent MAGIC detection of S4 0218+35 at $z = 0.944$.

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Photometric Redshifts in the Hawaii-Hubble Deep Field-North (H-HDF-N)

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We derive photometric redshifts ($z_{\rm phot}$) for sources in the entire (~ 0.4 deg^2) Hawaii-Hubble Deep Field-North (H-HDF-N) field with the EAzY code, based on point spread function-matched photometry of 15 broad bands from the ultraviolet (U band) to mid-infrared (IRAC 4.5 μm). Our catalog consists of a total of 131,678 sources. We evaluate the $z_{\rm phot}$ quality by comparing $z_{\rm phot}$ with spectroscopic redshifts ($z_{\rm spec}$) when available, and find a value of normalized median absolute deviation $\sigma_{\rm NMAD}$=0.029 and an outlier fraction of 5.5% (outliers are defined as sources having $|z_{\rm phot} - z_{\rm spec}|/(1 + z_{\rm spec}) > 0.15$) for non-X-ray sources. More specifically, we obtain $\sigma_{\rm NMAD}$= 0.024 with 2.7% outliers for sources brighter than $R = 23$ mag, $\sigma_{\rm NMAD}$= 0.035 with 7.4% outliers for sources fainter than $R = 23$ mag, $\sigma_{\rm NMAD}$=0.026 with 3.9% outliers for sources having $z < 1$, and $\sigma_{\rm NMAD}$=0.034 with 9.0% outliers for sources having $z > 1$. Our $z_{\rm phot}$ quality shows an overall improvement over an earlier $z_{\rm phot}$ work that focused only on the central H-HDF-N area. We also classify each object as star or galaxy through template spectral energy distribution fitting and complementary morphological parametrization, resulting in 4959 stars and 126,719 galaxies. Furthermore, we match our catalog with the 2 Ms *Chandra* Deep Field-North main X-ray catalog. For the 462 matched non-stellar X-ray sources (281 having $z_{\rm spec}$), we improve their $z_{\rm phot}$ quality by adding three additional AGN templates, achieving $\sigma_{\rm NMAD}$= 0.035 and an outlier fraction of 12.5%. We make our catalog publicly available presenting both photometry and $z_{\rm phot}$, and provide guidance on how to make use of our catalog.

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The Infrared Medium-Deep Survey II: How to Trigger Radio-AGN? Hints from Their Environments

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Activity at the centers of galaxies, during which the central supermassive black hole is accreting material, is nowadays accepted to be rather ubiquitous and most probably a phase of every galaxy's evolution. It has been suggested that galactic mergers and interactions may be the culprits behind the triggering of nuclear activity. We use near-infrared data from the new Infrared Medium-Deep Survey (IMS) and the Deep eXtragalactic Survey (DXS) of the VIMOS-SA22 field and radio data at 1.4 GHz from the FIRST survey and a deep VLA survey to study the environments of radio-AGN over an area of 25 sq. degrees and down to a radio flux limit of 0.1 mJy and a J-band magnitude of 23 mag AB. Radio-AGN are predominantly found in environments similar to those of control galaxies at similar redshift, J-band magnitude, and U-R rest-frame absolute color. However, a sub-population of radio-AGN is found in environments up to 100 times denser than their control sources. We thus preclude merging as the dominant triggering mechanism of radio-AGN. Through the fitting of the broadband spectral energy distribution of radio-AGN in the least and most dense environments, we find that those in the least dense environments show higher radio-loudness, higher star formation efficiencies, and higher accretion rates, typical of the so-called high-excitation radio-AGN. These differences tend to disappear at z¿1. We interpret our results in terms of a different triggering mechanism for these sources that is driven by mass-loss through winds of young stars created during the observed ongoing star formation.

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