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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

The relation between morphology, accretion modes and environmental factors in local radio AGN

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The goal of this work is to determine the nature of the relation between morphology and accretion mode in radio galaxies, including environmental parameters. The CoNFIG extended catalogue (improved by new K_S-band identifications and estimated redshifts from UKIDSS, and spectral index measurements from new GMRT observations) is used to select a sub-sample of 206 radio galaxies with $z \leq 0.3$ over a wide range of radio luminosity, which are morphology-classified using the Fanaroff-Riley (FR) classification of extended radio sources. For each galaxy, spectroscopic data are retrieved to determine the high/low excitation status of the source, related to its accretion mode. Environmental factors, such as the host galaxy luminosity and a richness factor are also computed, generally using SDSS data. We find the following results: (1) At a given radio luminosity, the FR morphological split of sources is consistent with being the same for both accretion modes. This remains true if analysis is restricted to only rich or only poor environments. If confirmed with a larger sample, this would imply that extended radio morphology is independent of the accretion mode of the black hole, depending only on the power of the resultant jet, and its interactions with the larger-scale environment. (2) Excitation modes seem to be linked to the source environment, with high-excitation galaxies found almost exclusively in low-density environments while low-excitation galaxies occupy a wider range of densities; this result is independent of FR morphology, and is consistent with the different fuelling mechanisms expected for these excitation modes. (3) Independent of excitation mode, FRI sources are found to lie in higher density environments, on average, than FRII sources, consistent with FRI sources having their jets disrupted by a denser surrounding medium. However, there is a significant overlap in environment between the two classes, and no clear driving factor between the FRI and FRII sources is found even when combining radio luminosity, accretion mode, large-scale environment and host galaxy luminosity.

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Resolving the coronal line region of NGC 1068 with near infrared integral field spectroscopy

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We present AO-assisted J- and K-band integral field spectroscopy of the inner 300×300 pc of the Seyfert 2 galaxy NGC 1068. The data were obtained with the Gemini NIFS integral field unit spectrometer, which provided us with high-spatial and -spectral resolution sampling. The wavelength range covered by the observations allowed us to study the [Ca VIII], [Si VI], [Si VII], [Al IX] and [S IX] coronal-line (CL) emission, covering ionization potentials up to 328 eV. The observations reveal very rich and complex structures, both in terms of velocity fields and emission-line ratios. The CL emission is elongated along the NE-SW direction, with the stronger emission preferentially localized to the NE of the nucleus. CLs are emitted by gas covering a wide range of velocities, with maximum blueshifts/redshifts of $\sim -1600/1000$ km s^{-1}. There is a trend for the gas located on the NE side of the nucleus to be blueshifted while the gas located towards the SW is redshifted. The morphology and the kinematics of the near-infrared CLs are in very good agreement with the ones displayed by low-ionization lines and optical CLs, suggesting a common origin. The line flux distributions, velocity maps, ionization structure (traced by the [Si VII]/[Si VI] emission-line ratio) and low ionization emission-line ratios (i.e., [Fe II]/Paβ and [Fe II]/[P II]) suggest that the radio jet plays an important role in the structure of the coronal line region of this object, and possibly in its kinematics.

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Flare-like variability of the Mg IIλ2800Å emission line in the γ-ray blazar 3C 454.3

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We report the detection of a statistically significant flare-like event in the Mg IIλ2800Å emission line of 3C 454.3 during the outburst of autumn 2010. The highest levels of emission line flux recorded over the monitoring period (2008 - 2011) coincide with a superluminal jet component traversing through the radio core. This finding crucially links the broad-emission line fluctuations to the non-thermal continuum emission produced by relativistically moving material in the jet and hence to the presence of broad-line region clouds surrounding the radio core. If the radio core were located at several parsecs from the central black hole then our results would suggest the presence of broad-line region material outside the inner parsec where the canonical broad-line region is envisaged to be located. We briefly discuss the implications of broad-emission line material ionized by non-thermal continuum on the context of virial black hole mass estimates and gamma-ray production mechanisms.

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Characterization of a Sample of Intermediate-type AGNs. I. Spectroscopic Properties and Serendipitous Discovery of New Dual AGNs

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A sample of 10 nearby intermediate-type active galactic nuclei (AGNs) drawn from the Sloan Digital Sky Survey is presented. The aim of this work is to provide estimations of the black hole (BH) mass for the sample galaxies from the dynamics of the broad-line region. For this purpose, a detailed spectroscopic analysis of the objects was done. Using Baldwin-Phillips-Terlevich diagnostic diagrams, we have carefully classified the objects as true intermediate-type AGNs and found that 80%+7.2% -17.3% are composite AGNs. The BH mass estimated for the sample is within $6.54 \pm 0.16 < \log \mathrm{M}_{BH} < 7.81 \pm 0.14$. Profile analysis shows that five objects (J120655.63+501737.1, J121607.08+504930.0, J141238.14+391836.5, J143031.18+524225.8, and J162952.88+242638.3) have narrow double-peaked emission lines in both the red (Hα, [N II] ??6548,6583 and [S II] ??6716, 6731) and the blue (Hβ and [O III] ??4959, 5007) regions of the spectra, with velocity differences (ΔV) between the double peaks within 114 km s^{-1} $< \Delta V <$ 256 km s^{-1}. Two of them, J121607.08+504930.0 and J141238.14+391836.5, are candidates for dual AGNs since their double-peaked emission lines are dominated by AGN activity. In searches of dual AGNs, type 1, type II, and intermediate-type AGNs should be carefully separated, due to the high serendipitous number of narrow double-peaked sources (50% ± 14.4%) found in our sample.

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Characterization of a sample of intermediate-type AGN. II. Host Bulge Properties and Black Hole Mass Estimates

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We present a study of the host bulge properties and their relations with the black hole mass on a sample of 10 intermediate-type active galactic nuclei (AGN). Our sample consists mainly of early type spirals, four of them hosting a bar. For 70^{+10}_{-17}% of the galaxies we have been able to determine the type of the bulge, and find that these objects probably harbor a pseudobulge or a combination of classical bulge/ pseudobulge, suggesting that pseudobulges might be frequent in intermediate-type AGN. In our sample, 50±14% of the objects show double-peaked emission lines. Therefore, narrow double-peaked emission lines seem to be frequent in galaxies harboring a pseudobulge or a combination of classical bulge/ pseudobulge. Depending on the bulge type, we estimated the black hole mass using the corresponding $M_{BH} - \sigma*$ relation and found them with a range of: $5.69 \pm 0.21 < \log M_{BH}^{\sigma*} < 8.09 \pm 0.24$. Comparing these $M_{BH}^{\sigma*}$ values with masses derived from the FWHM of Hβ and the continuum luminosity at 5100 Åfrom their SDSS-DR7 spectra (M_{BH}) we find that eight out of ten (80^{+7}_{-17}%) galaxies have black hole masses that are compatible within a factor of 3. This result would support that M_{BH} and $M_{BH}^{\sigma*}$ are the same for intermediate-type AGN as has been found for type 1 AGN. However, when the type of the bulge is taken into account only 3 out of the 7 (43^{+18}_{-15}%) objects

of the sample have their $M_{BH}^{\sigma*}$ and M_{BH} compatible within 3-σ errors. We also find that estimations based on the $M_{BH} - \sigma*$ relation for pseudobulges are not compatible in 50±20% of the objects.

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Effect of the interactions and environment on nuclear activity

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We present a study of the prevalence of optical and radio nuclear activity with respect to the environment and interactions in a sample of SDSS galaxies. The aim is to determine the independent effects of distinct aspects of source environment on the triggering of different types of nuclear activity. We defined a local density parameter and a tidal forces estimator and used a cluster richness estimator from the literature to trace different aspects of environment and interaction. The possible correlations between the environmental parameters were removed using a principal component analysis. By far the strongest trend found for the active galactic nuclei (AGN) fractions, of all AGN types, is with galaxy mass. We therefore applied a stratified statistical method that takes into account the effect of possible confounding factors like the galaxy mass. We found that (at fixed mass) the prevalence of optical AGN is a factor 2–3 lower in the densest environments, but increases by a factor of ~ 2 in the presence of strong one-on-one interactions. These effects are even more pronounced for star-forming nuclei. The importance of galaxy interactions decreases from star-forming nuclei to Seyferts to LINERS to passive galaxies, in accordance with previous suggestions of an evolutionary time-sequence. The fraction of radio AGN increases very strongly (by nearly an order of magnitude) towards denser environments, and is also enhanced by galaxy interactions. Overall, the results agree with a scenario in which the mechanisms of accretion into the black hole are determined by the presence and nature of a supply of gas, which in turn is controlled by the local density of galaxies and their interactions. A plentiful cold gas supply is required to trigger star-formation, optical AGN and radiatively-efficient radio AGN. This is less common in the cold-gas-poor environments of groups and clusters, but is enhanced by one-on-one interactions which result in the flow of gas into nuclear regions; these two factors compete against each other. In the denser environments where cold gas is rare, cooling hot gas can supply the nucleus at a sufficient rate to fuel low-luminosity radiatively-inefficient radio AGN. However, the increased prevalence of these AGN in interacting galaxies suggests that this is not the only mechanism by which radiatively-inefficient AGN can be triggered.

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Accretion disk wind as explanation for the broad-line region structure in NGC 5548

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Supermassive black holes in the centers of active galactic nuclei (AGN) are surrounded by broad-line regions (BLRs). The broad emission lines seen in the AGN spectra are emitted in this spatially unresolved region. We intend to obtain information on the structure and geometry of this BLR based on observed line profiles. We modeled the rotational and turbulent velocities in the line-emitting region on the basis of the line-width FWHM and line dispersion σ_{line} of the variable broad emission lines in NGC 5548. Based on these velocities we estimated the height of the line-emitting regions above the midplane in the context of their distances from the center. The broad emission lines originate at distances of 2 to 27 light days from the center. Higher ionized lines originate in the inner region ($\leq$ 13 light days) in specific filamentary structures 1 to 14 light days above the midplane. In contrast, the Hβ line is emitted in an outer (6 - 26 light days), more flattened configuration at heights of 0.7 to 4 light days only above the midplane. The derived geometry of the line-emitting region in NGC 5548 is consistent with an outflowing wind launched from an accretion disk.

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