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

Rob Beswick

# Abstracts of recently accepted papers

## XMM-Newton observations of the Narrow-Line Seyfert 1 galaxy Mrk 335 in an historical low X-ray flux state

**Dirk Grupe[1], Stefanie Komossa[2], Luigi C. Gallo[3], Andrew C. Fabian[4], Josefin Larsson[4], Anil K. Pradhan[5], Dawei Xu[6], & Giovanni Miniutti[4]**

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We report the discovery of strong soft X-ray emission lines and a hard continuum above 2 keV in the Narrow-Line Seyfert 1 galaxy Mrk 335 during an extremely low X-ray flux state. Mrk 335 was observed for 22 ks by *XMM-Newton* in July 2007 as a Target of Opportunity to examine it in its X-ray low-flux state, which was discovered with *Swift*. Long-term light curves suggest that this is the lowest flux state this AGN has ever been seen in. However, Mrk 335 is still sufficiently bright that its X-ray properties can be studied in detail. The X-ray continuum spectrum is very complex and requires several components to model. Statistically, partial covering and blurred reflection models work well. We confirm the presence of a strong narrow Fe line at 6.4 keV. High-resolution spectroscopy with the *XMM-Newton*-RGS reveals strong, soft X-ray emission lines not detected in previous, higher signal-to-noise, *XMM-Newton* observations, such as: highly ionized Fe lines, O VII, Ne IX and Mg XI lines. The optical/UV fluxes are similar to those previously measured with *Swift*. Optical spectroscopy taken in 2007 September do not show any changes to optical spectra obtained 8 years earlier.

Accepted for publication by the Astropysical Journal (scheduled for July 1st, 2008)

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preprint available at arXiv:0803.2516

## Deficiency of Broad Line AGNs in Compact Groups of Galaxies

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Based on a new survey of AGN activity in Compact Groups of Galaxies, we report a remarkable deficiency of Broad Line AGNs as compared to Narrow Line AGNs. The cause of such deficiency could be related to the average low luminosity of AGNs in CGs: $10^{39}$ erg s$^{-1}$. This result may imply lower accretion rates in CG AGNs, making Broad Line Regions (BLR) undetectable, or may indicate a genuine absence of BLRs. Both phenomena are consistent with gas stripping through tidal interaction and dry mergers.

For the first time, a clear relation between the environment of galaxies and their type of nuclear activity is encountered. In CG environment, galaxies are undergoing morphological transformations and the main mechanisms for such transformations are tidal interactions and mergers. Our analysis suggests that the combined effects of these two mechanisms also result in an important decrease in the amount of gas that can reach the nucleus to form a BLR in AGNs.

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preprint available at http://arxiv.org/abs/0803.3506

## An absorption origin for the X-ray spectral variability of MCG-6-30-15

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The Seyfert I galaxy MCG-6-30-15 shows one of the best examples of a broad "red wing" of emission in its X-ray spectrum at energies $2 < E < 6.4$ keV, commonly interpreted as being caused by relativistically-blurred reflection close to the event horizon of the black hole. We aim to test an alternative model in which absorption creates the observed spectral shape, explains the puzzling lack of variability of the red wing and reduces the high reflection albedo, substantially greater than unity, that is otherwise inferred at energies $E > 20$ keV. We compiled all the available long-exposure, high-quality data for MCG-6-30-15: 522 ks of Chandra HETGS, 282 ks of XMM-Newton pn/RGS and 253 ks of Suzaku XIS/PIN data. This is the first analysis of this full dataset. We investigated the spectral variability on timescales $> 20$ ks using principal components analysis and fitted spectral models to "flux state" and mean spectra over the energy range 0.5-45 keV (depending on detector). The absorber model was based on the zones previously identified in the high-resolution grating data. Joint fits were carried out to any data that were simultaneous. Multiple absorbing zones covering a wide range of ionisation are required by the grating data, including a highly ionised outflowing zone. A variable partial-covering zone plus absorbed low-ionisation reflection, distant from the source, provides a complete description of the variable X-ray spectrum. A single model fits all the data. We conclude that these zones are responsible for the red wing, its apparent lack of variability, the absorption structure around the Fe K-alpha line, the soft-band "excess" and the high flux seen in the hard X-ray band. A relativistically-blurred Fe line is not required in this model. We suggest the partial covering zone is a clumpy wind from the accretion disk.

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## Coevolution of Supermassive Black Holes and Circumnuclear Disks

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We propose a new evolutionary model of a supermassive black hole (SMBH) and a circumnuclear disk (CND), taking into account the mass-supply from a host galaxy and the physical states of CND. In the model, two distinct accretion modes depending on gravitational stability of the CND play a key role on accreting gas to a SMBH. (i) If the CMD is gravitationally unstable, energy feedback from supernovae (SNe) supports a geometrically thick, turbulent gas disk. The accretion in this mode is dominated by turbulent viscosity, and it is significantly larger than that in the mode (ii), i.e., the CMD is supported by gas pressure. Once the gas supply from the host is stopped, the high accretion phase ($\sim 0.01 - 0.1 M_\odot\,\mathrm{yr}^{-1}$) changes to the low one (mode (ii), $\sim 10^{-4} M_\odot\,\mathrm{yr}^{-1}$), but there is a delay with $\sim 10^8$ yr. Through this evolution, the gas-rich CND turns into the gas poor stellar disk. We found that not all the gas supplied from the host galaxy to the central 100 pc region accrete onto the SMBH even in the high accretion phase (mode (i)), because the part of gas is used to form stars. Outflow from the circumnuclear region also suppresses the growth of the SMBH. As a result, the final SMBH mass ($M_{\mathrm{BH,final}}$) is not proportional to the total gas mass supplied from the host galaxy ($M_{\mathrm{sup}}$); $M_{\mathrm{BH,final}}/M_{\mathrm{sup}}$ decreases with $M_{\mathrm{sup}}$. This would indicate that it is difficult to form a SMBH with $\sim 10^9 M_\odot$ observed at high-$z$ QSOs. The evolution of the SMBH and CND would be related to the evolutionary tracks of different type of AGNs. We found that the AGN luminosity tightly correlates with the luminosity of the nuclear starburst only in the high-accretion phase (mode (ii)). This implies that the AGN-starburst connection depends on the evolution of the AGN activity.

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