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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

Insights on the X–ray weak quasar phenomenon from XMM–Newton monitoring of PHL 1092

G. Miniutti[1], W. N. Brandt[2,3], D. P. Schneider[2,3], A. C. Fabian[4], L. C. Gallo[5] and Th. Boller [6]

[1] Centro de Astrobiología (CSIC–INTA), Dep. de Astrofísica; ESA, P.O: Box 78, E-28691, Villanueva de la Cañada, Madrid
[2] Department of Astronomy and Astrophysics, The Pennsylvania State University, 525 Davey Lab., Univeristy Park, PA 16802
[3] Institute for Gravitation and the Cosmos, The Pennsylvania State University, University Park, PA 16802
[4] Institute of Astronomy, Madingley Road, Cambridge CB3 0HA
[5] Department of Astronomy & Physics, Saint Mary's University, 923 Robie Street, Halifax, NS B3H 3C3
[6] Max–Planck–Institut für extraterrestrische Physik, Postfach 1312, 85741 Garching

PHL 1092 is a $z \sim 0.4$ high–luminosity counterpart of the class of Narrow–Line Seyfert 1 galaxies. In 2008, PHL 1092 was found to be in a remarkably low X–ray flux state during an *XMM–Newton* observation. Its 2 keV flux density had dropped by a factor of ∼260 with respect to a previous observation performed 4.5 yr earlier. The UV flux remained almost constant, resulting in a significant steepening of the optical–to–X–ray slope $\alpha_{\rm ox}$ from −1.57 to −2.51, making PHL 1092 one of the most extreme X–ray weak quasars with no observed broad absorption lines (BALs) in the UV. We have monitored the source since 2008 with three further *XMM–Newton* observations, producing a simultaneous UV and X–ray database spanning almost 10 yr in total in the activity of the source. Our monitoring program demonstrates that the $\alpha_{\rm ox}$ variability in PHL 1092 is entirely driven by long–term X–ray flux changes. We apply a series of physically–motivated models with the goal of explaining the UV–to–X–ray spectral energy distribution (SED) and the extreme X–ray and $\alpha_{\rm ox}$ variability. We consider three possible models: i) A *breathing corona* scenario in which the size of the X–ray emitting corona is correlated with the X–ray flux. In this case, the lowest X–ray flux states of PHL 1092 are associated with an almost complete collapse of the X–ray corona down to the marginal stable orbit; ii) An absorption scenario in which the X–ray flux variability is entirely due to intervening absorption. If so, PHL 1092 is a quasar with standard X–ray output for its optical luminosity, appearing as X–ray weak at times due to absorption; iii) A disc–reflection–dominated scenario in which the X–ray emitting corona is confined within a few gravitational radii from the

black hole at all times. In this case, the intrinsic variability of PHL 1092 only needs to be a factor of ~ 10 rather than the observed factor of ~ 260. We discuss these scenarios in the context of non–BAL X–ray weak quasars.

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E-mail contact: gminiutti@cab.inta-csic.es,
preprint available at ArXiv:1207.0694

Smooth and Clumpy Dust Distribution in AGN: a Direct Comparison of two Commonly Explored Infrared Emission Models

A. Feltre[1,2], E. Hatziminaoglou[2], J. Fritz[3], A. Franceschini[1]

[1]Dipartimento di Fisica e Astronomia, Vicolo Osservatorio 2, I-35122 Padova, Italy
[2]ESO, Karl-Schwarzschild-Str. 2, 85748 Garching bei München, Germany
[3]Sterrenkundig Observatorium Vakgroep Fysica en Sterrenkunde Universiteit Gent Krijgslaan 281, S9 9000 Gent

The geometry of the dust distribution within the inner regions of Active Galactic Nuclei (AGN) is still a debated issue and relates directly with the AGN unified scheme. Traditionally, models discussed in the literature assume one of two distinct dust distributions in what is believed to be a toroidal region around the Supermassive Black Holes: a continuous distribution, customarily referred to as *smooth*, and a concentration of dust in clumps or clouds, referred to as *clumpy*.

In this paper we perform a thorough comparison between two of the most popular models in the literature, namely the smooth models by Fritz et al. (2006) and the clumpy models by Nenkova et al. (2008a), in their common parameters space. Particular attention is paid to the silicate features at $\sim$9.7 and $\sim$18 μm, the width of the infrared bump, the near-infrared index and the luminosity at 12.3 μm, all previously reported as possible diagnostic tools to distinguish between the two dust distributions. We find that, due to the different dust chemical compositions used in the two models, the behaviour of the silicate features at 9.7 and 18 μm is quite distinct between the two models. The width of the infrared bump and the peak of the infrared emission can take comparable values, their distributions do, however, vary. The near-infrared index is also quite different, due partly to the primary sources adopted by the two models. Models with matched parameters do not produce similar SEDs and virtually no random parameter combinations can result in seemingly identical SEDs.

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E-mail contact: afeltre@eso.org, feltre.anna@gmail.com
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The SEDs, Host Galaxies and Environments of Variability Selected AGN in GOODS-S

Carolin Villforth[1,2], Vicki Sarajedini[1] and Anton Koekemoer[2]

[1] Department of Astronomy, University of Florida, 32611 Gainesville, FL, USA
[2] Space Telescope Science Institute, 21218 Baltimore, MD, USA

Variability selection has been proposed as a powerful tool for identifying both low-luminosity AGN and those with unusual SEDs. However, a systematic study of sources selected in such a way has been lacking. In this paper, we present the multi-wavelength properties of the variability selected AGN in GOODS South. We demonstrate that variability selection indeed reliably identifies AGN, predominantly of low luminosity. We find contamination from stars as well as a very small sample of sources that show no sign of AGN activity, their number is consistent with the expected false positive rate. We also study the host galaxies and environments of the AGN in the sample. Disturbed host morphologies are relatively common. The host galaxies span a wide range in the level of ongoing star-formation. However, massive star-bursts are only present in the hosts of the most luminous AGN in the sample. There is no clear environmental preference for the AGN sample in general but we find that the most luminous AGN on average avoid dense regions while some low-luminosity AGN hosted by late-type galaxies are found near the centres of groups. AGN in our sample have closer nearest neighbours than the general galaxy population. We find no indications that major mergers are a dominant triggering process for the moderate to low luminosity AGN in this sample. The environments and host galaxy properties instead suggest secular processes, in particular tidal processes at first passage and minor mergers, as likely triggers for the objects studied. This study demonstrates the strength of variability selection for AGN and gives first hints at possibly triggering mechanisms for high-redshift low luminosity AGN.

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E-mail contact: villforth@astro.ufl.edu,
preprint available at ArXiv:1207.4478

CHEERS RESULTS ON MRK 573: STUDY OF DEEP *CHANDRA* OBSERVATIONS

Alessandro Paggi[1], Junfeng Wang[1], Giuseppina Fabbiano[1], Martin Elvis[1] and Margarita Karovska[1]

[1] arvard-Smithsonian Center for Astrophysics, 60 Garden St, Cambridge, MA 02138, USA

We present results on Mrk 573 obtained as part of the CHandra survey of Extended Emission-line Regions in nearby Seyfert galaxies (CHEERS). Previous studies showed that this source features a biconical emission in the soft X-ray band closely related with the Narrow Line Region as mapped by the [O III] emission line and the radio emission, though on a smaller scale; we investigate the properties of soft X-ray emission from this source with new deep *Chandra* observations. Making use of the subpixel resolution of the *Chandra*/ACIS image and PSF-deconvolution, we resolve and study substructures in each ionizing cone. The two cone spectra are fitted with photoionization model, showing a mildly photoionized phase diffused over the bicone. Thermal collisional gas at about ~ 1.1 keV and ~ 0.8 keV appears to be located between the nucleus and the "knots" resolved in radio observations, and between the "arcs" resolved in the optical images, respectively; this can be interpreted in terms of shock interaction with the host galactic plane. The nucleus shows a significant flux decrease across the observations indicating variability of the AGN, with the nuclear region featuring higher ionization parameter with respect to the bicone region. The long exposure allows us to find extended emission up to ~ 7 kpc from the nucleus along the bicone axis. Significant emission is also detected in the direction perpendicular to the ionizing cones, disagreeing with the fully obscuring torus prescribed in the AGN unified model, and suggesting instead the presence of a clumpy structure.

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preprint available at ArXiv:1203.1279

Toward a Unified AGN Structure

Demosthenes Kazanas[1], Keigo Fukumura[1,2], Ehud Behar[3], Ioannis Contopoulos[4] and Chris R. Shrader[1,5]

[1] Astrophysics Science Division, NASA/Goddard Space Flight Center, Greenbelt, MD 20771

[2] University of Maryland, Baltimore County (UMBC/CRESST), Baltimore, MD 21250

[3] Department of Physics, Technion, Haifa 32000, Israel

[4] Research Center for Astronomy, Academy of Athens, Athens 11527, Greece

[5] Universities Space Research Association

We present a unified model for the structure and appearance of accretion powered sources across their entire luminosity range from galactic X-ray binaries to luminous quasars, with emphasis on AGN and their phenomenology. Central to this model is the notion of MHD winds launched from the accretion disks that power these objects. These winds provide the matter that manifests as blueshifted absorption features in the UV and X-ray spectra of a large fraction of these sources; furthermore, their density distribution in the poloidal plane determines the "appearance" (i.e. the column and velocity structure of these absorption features) as a function of the observer inclination angle. This work focuses on just the broadest characteristics of these objects; nonetheless, it provides scaling laws that allow one to reproduce within this model the properties of objects spanning a very wide luminosity range and viewed at different inclination angles, and trace them to a common underlying dynamical structure. Its general conclusion is that the AGN phenomenology can be accounted for in terms of three parameters: The wind mass flux in units of the Eddington value, $\dot{m}$, the observer's inclination angle θ and the logarithmic slope between the O/UV and X-ray fluxes α_{OX}. However, because of a significant correlation between α_{OX} and UV luminosity, we conclude that the AGN structure depends on only two parameters. Interestingly, the correlations implied by this model appear to extend to and consistent with the characteristics of galactic X-ray sources, suggesting the presence of a truly unified underlying structure for accretion powered sources.

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E-mail contact: demos.kazanas@nasa.gov,
preprint available at arXiv:1206.5022

Broad Band Photometric Reverberation Mapping of NGC 4395

Haim Edri[1], Stephen E. Rafter[1] , Doron Chelouche[2] , Shai Kaspi[1] , and Ehud Behar[1]

[1] Physics Department, the Technion, Haifa 32000, Israel
[2] Physics yourDepartment, Faculty of Natural Sciences, University of Haifa, Israel

We present results testing broad band photometric reverberation mapping (RM) to measure the radius of the broad line region, and subsequently the black hole mass ($M_{\rm BH}$), in the nearby, low luminosity active galactic nuclei (AGN) NGC 4395. Using the Wise Observatory's 1m telescope equipped with the SDSS g′, r′ and i′ broad band filters, we monitored NGC 4395 for 9 consecutive nights and obtained 3 light curves each with over 250 data points. The g′ and r′ bands include time variable contributions from Hβ and Hα (respectively) plus continuum. The i′ band is free of broad lines and covers exclusively continuum. We show that by looking for a peak in the difference between the cross-correlation and the auto-correlation functions for all combinations of filters, we can get a reliable estimate of the time lag necessary to compute $M_{\rm BH}$. We measure a time lag for Hα to be 3.6 ± 0.8 hours, comparable to previous studies using the line resolved spectroscopic RM method. We argue that this lag implies a black hole mass $M_{\rm BH} = (4.9 \pm 2.6) \times 10^4$ $M_\odot$.

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Thesis Abstracts

Determining Inclinations of Active Galactic Nuclei Via Their Narrow-Line Region Kinematics

Travis C. Fischer

Thesis work conducted at: Georgia State University, USA

Current address: 1 Park Place SE, Suite 700, Atlanta, GA 30303-2911, USA

Electronic mail: fischer@chara.gsu.edu

Ph.D dissertation directed by: D. Michael Crenshaw

Ph.D degree awarded: August 2012

Active Galactic Nuclei (AGN) are axisymmetric systems to first order; their observed properties are likely strong functions of inclination with respect to our line of sight. However, except for a few special cases, the specific inclinations of individual AGN are unknown. We have developed a promising technique for determining the inclinations of nearby AGN by mapping the kinematics of their narrow-line regions (NLRs), which are easily resolved with *Hubble Space Telescope* (*HST*) [O III] imaging and long-slit spectra from the Space Telescope Imaging Spectrograph (STIS). Our studies indicate that NLR kinematics dominated by radial outflow can be fit with simple biconical outflow models that can be used to determine the inclination of the bicone axis, and hence the obscuring torus, with respect to our line of sight. We present NLR analysis of 52 Seyfert galaxies and resultant inclinations from models of 17 individual AGN with clear signatures of biconical outflow. From these AGN, we can for the first time assess the effect of inclination on other observable properties in radio-quiet AGN, including the discovery of a distinct correlation between AGN inclination and X-ray column density.