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

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.

Thanks for your continued subscription.

Megan Argo

Abstracts of recently accepted papers

Star formation black hole growth and dusty tori in the most luminous AGNs at z=2-3.5

Hagai Netzer[1], Caterina Lani[1], Raanan Nordon[1], Benny Trakhtenbrot[2], Paulina Lira[4] and Ohad Shemmer[3]

[1] School of Physics and Astronomy, Tel Aviv University, Tel Aviv 69978
[2] Institute for Astronomy, Department of Physics, ETH Zurich, Wolfgang-Pauli-Strasse 27, CH-8093 Zurich, Switzerland (Zwicky postdoctoral fellow)
[3] Department of Physics, University of North Texas, Denton, TX 76203, USA
[4]Departamento de Astronomia, Universidad de Chile, Camino del Observatorio 1515, Santiago, Chile

We report *Herschel*/SPIRE observations of 100 very luminous, optically selected active galactic nuclei (AGNs) at $z = 2 - 3.5$ with log L_{1350A} (erg/sec)$\geq$ 46.5. The distribution in L_{1350A} is similar to the general distribution of SDSS AGNs in this redshift and luminosity interval. We measured star formation (SF) luminosity, L_{SF}, and SF rate (SFR) in 34 detected sources by fitting combined SF and torus templates, where the torus emission is based on WISE observations. We also obtained statistically significant stacks for the undetected sources in two luminosity groups. The sample properties are compared with those of very luminous AGNs at $z > 4.5$. The main findings are: 1) The mean and the median SFRs of the detected sources are 1176^{+476}_{-339} and 1010^{+706}_{-503} solar-mass/yr, respectively. The mean SFR of the undetected sources is 148 solar-mass/yr. The ratio of SFR to BH accretion rate is ≈ 80 for the detected sources and less than 10 for the undetected sources. Unlike a sample of sources at $z \simeq 4.8$ we studied recently, there is no difference in L_{AGN} and only a very small difference in L_{torus} between detected and undetected sources. 2) The redshift distribution of L_{SF} and L_{AGN} for the most luminous, redshift 2–7 AGNs are different. Similar to previous studies, the highest L_{AGN} are found at $z \approx 3$. However, L_{SF} of such sources peaks at $z \approx 5$. Assuming the objects in our sample are hosted by the most massive galaxies at those redshifts, we find that approximately 2/3 of the hosts are already below the main-sequence of SF galaxies at z=2-3.5. 3) The spectral energy distributions (SEDs) of dusty tori at high redshift are similar to the shapes found in low redshift, low luminosity AGNs. *Herschel* upper limits put strong constraints on the long wavelength shape of the SED ruling out several earlier suggested torus templates that are applicable for this sample. 4) We find no evidence for a luminosity dependence of the torus covering factor in sources with log L_{AGN} (erg/sec)=44-47.5. This conclusion is based on the recognition that the estimated L_{AGN} in several earlier studies is highly uncertain and non-uniformally treated. The median covering factors over this range are 0.68 for isotropic dust emission and 0.4 for anisotropic emission.

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E-mail contact: netzer@wise.tau.ac.il
Preprint available at http://arxiv.org/abs/1511.07876

The 2 Ms Chandra Deep Field-North Survey and the 250 ks Extended Chandra Deep Field-South Survey: Improved Point-Source Catalogs

Y. Q. Xue[1], B. Luo[2,3], W. N. Brandt[2,3,4], D. M. Alexander[5], F. E. Bauer[6,7,8], B. D. Lehmer[9,10,11], and G. Yang[2,3]

[1] CAS Key Laboratory for Researches in Galaxies and Cosmology, Center for Astrophysics, Department of Astronomy, University of Science and Technology of China, Chinese Academy of Sciences, Hefei, Anhui 230026, China; xuey@ustc.edu.cn
[2] Department of Astronomy and Astrophysics, Pennsylvania State University, University Park, PA 16802, USA
[3] Institute for Gravitation and the Cosmos, Pennsylvania State University, University Park, PA 16802, USA
[4] Department of Physics, Pennsylvania State University, University Park, PA 16802, USA
[5] Centre for Extragalactic Astronomy, Department of Physics, Durham University, Durham, DH1 3LE, UK
[6] Instituto de Astrofísica, Facultad de Física, Pontificia Universidad Católica de Chile, Casilla 306, Santiago 22, Chile
[7] Millennium Institute of Astrophysics
[8] Space Science Institute, 4750 Walnut Street, Suite 205, Boulder, Colorado 80301
[9] The Johns Hopkins University, Homewood Campus, Baltimore, MD 21218, USA
[10] NASA Goddard Space Flight Centre, Code 662, Greenbelt, MD 20771, USA
[11] Department of Physics, University of Arkansas, 226 Physics Building, 835 West Dickson Street, Fayetteville, AR 72701, USA

We present improved point-source catalogs for the 2 Ms *Chandra* Deep Field-North (CDF-N) and the 250 ks Extended Chandra Deep Field-South (E-CDF-S), implementing a number of recent improvements in *Chandra* source-cataloging methodology. For the CDF-N/E-CDF-S, we provide a main catalog that contains 683/1003 X-ray sources detected with WAVDETECT at a false-positive probability threshold of 10^{-5} that also satisfy a binomial-probability source-selection criterion of $P < 0.004/P < 0.002$. Such an approach maximizes the number of reliable sources detected: a total of 196/275 main-catalog sources are new compared to the Alexander et al. (2003) CDF-N/Lehmer et al. (2005) E-CDF-S main catalogs. We also provide CDF-N/E-CDF-S supplementary catalogs that consist of 72/56 sources detected at the same WAVDETECT threshold and having P of 0.004–0.1/0.002–0.1 and $K_s \leq 22.9/K_s \leq 22.3$ mag counterparts. For all ≈ 1800 CDF-N and E-CDF-S sources, including the ≈ 500 newly detected ones (these being generally fainter and more obscured), we determine X-ray source positions utilizing centroid and matched-filter techniques; we also provide multiwavelength identifications, apparent magnitudes of counterparts, spectroscopic and/or photometric redshifts, basic source classifications, and estimates of observed AGN and galaxy source densities around respective field centers. Simulations show that both the CDF-N and E-CDF-S main catalogs are highly reliable and reasonably complete. Background and sensitivity analyses indicate that the on-axis mean flux limits reached represent a factor of ≈ 1.5–2.0 improvement over the previous CDF-N and E-CDF-S limits. We make our data products publicly available.

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E-mail contact: xuey@ustc.edu.cn
Preprint available at http://arxiv.org/abs/1602.06299

Extended X-ray emission in the IC 2497 - Hanny's Voorwerp system: energy injection in the gas around a fading AGN

Lia Sartori[1], Kevin Schawinski, Michael Koss, Ezequiel Treister, W. Peter Maksym, William C. Keel, C. Megan Urry, Chris J. Lintott, O. Ivy Wong

[1] Institute for Astronomy, Department of Physics, ETH Zurich, Wolfgang-Pauli-Strasse 27, CH-8093 Zurich, Switzerland

We present deep *Chandra* X-ray observations of the core of IC 2497, the galaxy associated with Hanny's Voorwerp and hosting a fading AGN. We find extended soft X-ray emission from hot gas around the low intrinsic luminosity (unobscured) AGN ($L_{\rm bol} \sim 10^{42} - 10^{44}\,{\rm erg\,s^{-1}}$). The temperature structure in the hot gas suggests the presence of a bubble or cavity around the fading AGN ($\mathtt{E}_{\rm bub} \sim 10^{54} - 10^{55}$ erg). A possible scenario is that this bubble is inflated by the fading AGN, which after changing accretion state is now in a kinetic mode. Other possibilities are that the bubble has been inflated by the past luminous quasar ($L_{\rm bol} \sim 10^{46}\,{\rm erg\,s^{-1}}$), or that the temperature gradient is an indication of a shock front from a superwind driven by the AGN. We discuss the possible scenarios and the implications for the AGN-host galaxy interaction, as well as an analogy between AGN and X-ray binaries lifecycles. We conclude that the AGN could inject mechanical energy into the host galaxy at the end of its lifecycle, and thus provide a source for mechanical feedback, in a similar way as observed for X-ray binaries.

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preprint available at http://arxiv.org/abs/1601.07550

Peering through the Dust: *NuSTAR* Observations of Two FIRST-2MASS Red Quasars

Stephanie M. LaMassa[1,2,3], Angelo Ricarte[4], Eilat Glikman[5], C. Megan Urry[1,2], Daniel Stern[6], Tahir Yaqoob[7], George B. Lansbury[8], Francesca Civano[1,2,9,10], Steve E. Boggs[11], W. N. Brandt[12,13,14], Chien-Ting J. Chen[12,13], Finn E. Christensen[15], William W. Craig[11,16], Chuck J. Hailey[17], Fiona Harrison[18], Ryan C. Hickox[9], Michael Koss[19], Claudio Ricci[20], Ezequiel Treister[21], Will Zhang[3]

[1]Yale Center for Astronomy & Astrophysics, Physics Department, P.O. Box 208120, New Haven, CT 06520, USA
[2]Department of Physics, Yale University, P.O. Box 208121, New Haven, CT 06520, USA
[3]NASA Goddard Space Flight Center, Greenbelt, MD 20771, USA
[4]Department of Astronomy, Yale University, New Haven, CT 06511, USA
[5]Middlebury College, Department of Physics, Middlebury, VT 05753, USA
[6]Jet Propulsion Laboratory, California Institute of Technology, 4800 Oak Grove Drive, Mail Stop 169-221, Pasadena, CA 91109, USA
[7]Department of Physics, University of Maryland Baltimore County, 1000 Hilltop Circle, Baltimore, MD 21250
[8]Center for Extragalactic Astronomy, Department of Physics, University of Durham, South Road, Durham DH1 3LE, UK
[9]Department of Physics and Astronomy, Dartmouth College, 6127 Wilder Laboratory, Hanover, NH 03755,USA
[10]Harvard-Smithsonian Center for Astrophysics, 60 Garden Street, Cambridge, MA 02138, USA
[11]Space Sciences Laboratory, University of California, Berkeley, CA 94720, USA
[12]Department of Astronomy and Astrophysics, The Pennsylvania State University, 525 Davey Lab, University Park, PA 16802, USA
[13]Institute for Gravitation and the Cosmos, The Pennsylvania State University, 525 Davey Lab, University Park, PA, 16802, USA
[14]Department of Physics, The Pennsylvania State University, 525 Davey Lab, University Park, PA 16802, USA
[15]DTU SpaceNational Space Institute, Technical University of Denmark, Elektrovej 327, DK-2800 Lyngby, Denmark
[16]Lawrence Livermore National Laboratory, Livermore, CA 945503, USA
[17]Columbia Astrophysics Laboratory, Columbia University, NY 10027, USA
[18]Cahill Center for Astronomy and Astrophysics, California Institute of Technology, 1216 E. California Blvd, Pasadena, CA 91125, USA
[19]Institute for Astronomy, Department of Physics, ETH Zurich, Wolfgang-Pauli-Strasse 27, CH-8093 Zurich, Switzerland
[20]Instituto de Astrofísica, Pontificia Universidad Católica de Chile,Vicuña Mackenna 4860, 7820436 Macul, Santiago, Chile
[21]Universidad de Concepción, Departamento de Astronomía, Casilla 160-C, Concepción, Chile

Some reddened quasars appear to be transitional objects in the merger-induced black hole growth/galaxy evolution paradigm, where a heavily obscured nucleus starts to be unveiled by powerful quasar winds evacuating the surrounding cocoon of dust and gas. Hard X-ray observations are able to peer through this gas and dust, revealing the properties of circumnuclear obscuration. Here, we present *NuSTAR* and *XMM-Newton*/*Chandra* observations of FIRST-2MASS selected red quasars F2M 0830+3759 and F2M 1227+3214. We find that though F2M 0830+3759 is moderately obscured ($N_{\rm H,Z} = 2.1 \pm 0.2 \times 10^{22}$ cm^{-2}) and F2M 1227+3214 is mildly absorbed ($N_{\rm H,Z} = 3.4^{+0.8}_{-0.7} \times 10^{21}$ cm^{-2}) along the line-of-sight, heavier global obscuration may be present in both sources, with $N_{\rm H,S} = 3.7^{+4.1}_{-2.6} \times 10^{23}$ cm^{-2} and $< 5.5 \times 10^{23}$ cm^{-2}, for F2M 0830+3759 and F2M 1227+3214, respectively. F2M 0830+3759 also has an excess of soft X-ray emission below 1 keV which is well accommodated by a model where 7% of the intrinsic AGN X-ray emission is scattered into the line-of-sight. While F2M 1227+3214 has a dust-to-gas ratio ($E(B-V)/N_{\rm H}$) consistent with the Galactic value, the $E(B-V)/N_{\rm H}$ value for F2M 0830+3759 is lower than the Galactic standard, consistent with the paradigm that the dust resides on galactic scales while the X-ray reprocessing gas originates within the dust-sublimation zone of the broad-line-region. The X-ray and 6.1μm luminosities of these red quasars are consistent with the empirical relations derived for high-luminosity, unobscured quasars, extending the parameter space of obscured AGN previously observed by *NuSTAR* to higher luminosities.

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E-mail contact: stephanie.m.lamassa@nasa.gov
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Short term X-ray spectral variability of the quasar PDS 456 observed in a low flux state

G. A. Matzeu[1], J. N. Reeves, [1,2] E. Nardini, [1] V. Braito, [2,3] M. T. Costa, [1], F. Tombesi, [4,5] and J. Gofford, [1]

[1]Astrophysics Group, School of Physical and Geographical Sciences, Keele University, Keele, Staffordshire ST5 5BG, UK
[2]Center for Space Science and Technology, University of Maryland Baltimore County, 1000 Hilltop Circle, Baltimore, MD 21250, USA
[3]INAF Osservatorio Astronomico di Brera, Via Bianchi 46, I-23807 Merate (LC), Italy
[4]X-ray Astrophysics Laboratory, NASA/Goddard Space Flight Center, Greenbelt, MD, 20771, USA
[5]Department of Astronomy and CRESST, University of Maryland, College Park, MD, 20742, USA

We present a detailed analysis of a recent, 2013 *Suzaku* campaign on the nearby ($z = 0.184$) luminous ($L_{bol} \sim 10^{47}$ erg s^{-1}) quasar PDS 456. This consisted of three observations, covering a total duration of ~ 1 Ms and a net exposure of 455 ks. During these observations, the X-ray flux was unusually low, suppressed by a factor of > 10 in the soft X-ray band when compared to previous observations. We investigated the broadband continuum by constructing a Spectral Energy Distribution (SED), making use of the optical/UV photometry and hard X-ray spectra from the later simultaneous *XMM-Newton* and *NuSTAR* campaign in 2014. The high energy part of this low flux SED cannot be accounted for by physically self consistent accretion disc and corona models without attenuation by absorbing gas, which partially covers a substantial fraction of the line of sight towards the X-ray continuum. At least two layers of absorbing gas are required, of column density $\log(N_{\rm H,low}/{\rm cm}^{-2}) = 22.3\pm0.1$ and $\log(N_{\rm H,high}/{\rm cm}^{-2}) = 23.2 \pm 0.1$, with average line of sight covering factors of $\sim 80\%$ (with typical $\sim 5\%$ variations) and 60% ($\pm10 - 15\%$), respectively. During these observations PDS 456 displays significant short term X-ray spectral variability, on timescales of ~ 100 ks, which can be accounted for by variable covering of the absorbing gas along the line of sight. The partial covering absorber prefers an outflow velocity of $v_{\rm pc} = 0.25^{+0.01}_{-0.05}c$ at the $> 99.9\%$ confidence level over the case where $v_{\rm pc} = 0$. This is consistent with the velocity of the highly ionised outflow responsible for the blueshifted iron K absorption profile. We therefore suggest that the partial covering clouds could be the denser, or clumpy part of an inhomogeneous accretion disc wind. Finally estimates are placed upon the size-scale of the X-ray emission region from the source variability. The radial extent of the X-ray emitter is found to be of the order $\sim 15 - 20\ R_{\rm g}$, although the hard X-ray (> 2 keV) emission may originate from a more compact or patchy corona of hot electrons, which is typically $\sim 6 - 8\ R_{\rm g}$ in size.

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E-mail contact: g.matzeu@keele.ac.uk
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Integral Field Spectroscopy of the circumnuclear region of the Radio Galaxy Pictor A

Guilherme S. Couto[1], Thaisa Storchi-Bergmann[1], Andrew Robinson[2], Rogemar A. Riffel[3], Preeti Kharb[4], Davide Lena[2,5,6] and Allan Schnorr-Müller[7]

[1] Universidade Federal do Rio Grande do Sul, IF, CP 15051, Porto Alegre 91501-970, RS, Brazil
[2] School of Physics and Astronomy, Rochester Institute of Technology, 85 Lomb Memorial Dr., Rochester, NY 14623, USA
[3] Universidade Federal de Santa Maria, Departamento de Física, Centro de Ciências Naturais e Exatas, 97105-900, Santa Maria, RS, Brazil
[4] Indian Institute of Astrophysics, 2nd Block, Koramangala, Bangalore 560034, India
[5] SRON Netherlands Institute for Space Research, Sorbonnelaan 2, NL-3584 CA Utrecht, The Netherlands
[6] Department of Astrophysics/IMAPP, Radboud University, Nijmegen, PO Box 9010, NL-6500 GL Nijmegen, The Netherlands
[7] Max-Planck-Institute für Extraterrestrische Physik, Postfach 1312, D-85741 Garching, Germany

We present optical integral field spectroscopy of the inner $2.5 \times 3.4\,{\rm kpc}^2$ of the broad-line radio galaxy Pictor A, at a spatial resolution of ≈ 400 pc. Line emission is observed over the whole field-of-view, being strongest at the nucleus and in an elongated linear feature (ELF) crossing the nucleus from the south-west to the north-east along PA $\approx 70°$. Although the broad double-peaked Hα line and the [O I]6300/Hα and [S II]6717+31/Hα ratios are typical of AGNs, the [N II]6584/Hα ratio ($0.15 - 0.25$) is unusually low. We suggest that this is due to the unusually low metallicity of the gas. Centroid velocity maps show mostly blueshifts to the south and redshifts to the north of the nucleus, but the velocity field is not well fitted by a rotation model. Velocity dispersions are low ($< 100\,{\rm km\,s}^{-1}$) along the ELF, ruling out a jet-cloud interaction as the origin of this structure. The ELF shows both blueshifts and redshifts in channel maps, suggesting that it is close to the plane of the sky. The ELF is evidently photoionized by the AGN, but its kinematics and inferred low metallicity suggest that this structure may have originated in a past merger event with another galaxy. We suggest that the gas acquired in this interaction may be feeding the ELF.

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E-mail contact: gcouto@if.ufrgs.br
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IC 751: a new changing-look AGN discovered by *NuSTAR*

C. Ricci[1,2], F. E. Bauer[1,2,3,4], P. Arevalo[5], S. Boggs[6], W. N. Brandt[7,8,9], F. E. Christensen[10], W. W. Craig[6], P. Gandhi[11], C. J. Hailey[12], F. A. Harrison[13], M. Koss[14], C. B. Markwardt[15,16], D. Stern[17], E. Treister[18,2], W. W. Zhang[16]

[1] Instituto de Astrofísica, Facultad de Física, Pontificia Universidad Católica de Chile, Casilla 306, Santiago 22, Chile
[2] EMBIGGEN Anillo
[3] Millennium Institute of Astrophysics, Vicuña Mackenna 4860, 7820436 Macul, Santiago, Chile
[4] Space Science Institute, 4750 Walnut Street, Suite 205, Boulder, Colorado 80301, USA
[5] Instituto de Física y Astronomía, Facultad de Ciencias, Universidad de Valparaíso, Gran Bretana No 1111, Playa Ancha, Valparaíso, Chile.
[6] Space Sciences Laboratory, University of California, Berkeley, CA 94720, USA
[7] Department of Astronomy and Astrophysics, The Pennsylvania State University, University Park, PA 16802, USA
[8] Institute for Gravitation and the Cosmos, The Pennsylvania State University, University Park, PA 16802, USA
[9] Department of Physics, 104 Davey Lab, The Pennsylvania State University, University Park, PA 16802, USA
[10] DTU Space, National Space Institute, Technical University of Denmark, Elektronvej 327, DK-2800 Lyngby, Denmark
[11] School of Physics & Astronomy, University of Southampton, Highfield, Southampton, SO17 1BJ
[12] Columbia Astrophysics Laboratory, Columbia University, New York 10027, USA
[13] Cahill Center for Astronomy and Astrophysics, California Institute of Technology, Pasadena, CA 91125, USA
[14] Institute for Astronomy, Department of Physics, ETH Zurich, Wolfgang-Pauli-Strasse 27, CH-8093 Zurich, Switzerland
[15] Department of Astronomy, University of Maryland, College Park, MD 20742, USA
[16] Astroparticle Physics Laboratory, Mail Code 661, NASA Goddard Space Flight Center, Greenbelt, MD 20771, USA
[17] Jet Propulsion Laboratory, California Institute of Technology, Pasadena, CA 91109, USA
[18] Universidad de Concepción, Departamento de Astronomía, Casilla 160-C, Concepción, Chile

We present the results of five *NuSTAR* observations of the type 2 active galactic nucleus (AGN) in IC 751, three of which were performed simultaneously with *XMM-Newton* or *Swift*/XRT. We find that the nuclear X-ray source underwent a clear transition from a Compton-thick ($N_{\rm H} \simeq 2 \times 10^{24}\,{\rm cm}^{-2}$) to a Compton-thin ($N_{\rm H} \simeq 4 \times 10^{23}\,{\rm cm}^{-2}$) state on timescales of $\lesssim 3$ months, which makes IC 751 the first changing-look AGN discovered by *NuSTAR*. Changes of the line-of-sight column density at a $\sim 2\sigma$ level are also found on a time-scale of ~ 48 hours ($\Delta N_{\rm H} \sim 10^{23}\,{\rm cm}^{-2}$). From the lack of spectral variability on timescales of ~ 100 ks we infer that the varying absorber is located beyond the emission-weighted average radius of the broad-line region, and could therefore be related either to the external part of the broad-line region or a clumpy molecular torus. By adopting a physical torus X-ray spectral model, we are able to disentangle the column density of the non-varying absorber ($N_{\rm H} \sim 3.8 \times 10^{23}\,{\rm cm}^{-2}$) from that of the varying clouds [$N_{\rm H} \sim (1-150) \times 10^{22}\,{\rm cm}^{-2}$], and to constrain that of the material responsible for the reprocessed X-ray radiation ($N_{\rm H} \sim 6 \times 10^{24}\,{\rm cm}^{-2}$). We find evidence of significant intrinsic X-ray variability, with the flux varying by a factor of five on timescales of a few months in the 2–10 and 10–50 keV band.

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Discovery of Ultra-steep Spectrum Giant Radio Galaxy with Recurrent Radio Jet Activity in Abell 449

Dominika Hunik[1,2] and Marek Jamrozy[1]

[1] Obserwatorium Astronomiczne, Uniwersytet Jagielloński, ul. Orla 171, 30-244 Kraków, Poland
[2] Instytut Fizyki, Uniwersytet Jagielloński, ul. Łojasiewicza 11, 30-348 Kraków, Poland

We report a discovery of a 1.3 Mpc diffuse radio source with extremely steep spectrum fading radio structures in the vicinity of the Abell 449 cluster of galaxies. Its extended diffuse lobes are bright only at low radio frequencies and their synchrotron age is about 160 Myr. The parent galaxy of the extended relic structure, which is the dominant galaxy within the cluster, is starting a new jet activity. There are three weak X-rays sources in the vicinity of the cluster as found in the ROSAT survey, however it is not known if they are connected with this cluster of galaxies. Just a few radio galaxy relics are currently known in the literature, as finding them requires sensitive and high angular resolution low-frequency radio observations. Objects of this kind, which also are starting a new jet activity, are important for understanding the life cycle and evolution of active galactic nuclei. A new 613 MHz map as well as the archival radio data pertaining to this object are presented and analyzed.

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E-mail contact:dominika.hunik@uj.edu.pl
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Super- and sub-Eddington accreting massive black holes: A comparison of slim and thin accretion discs through study of the spectral energy distribution

Nuria Castello-Mor[1], Hagai Netzer[1], Shai Kaspi[1,2]

[1] School of Physics and Astronomy, Tel Aviv University, Tel Aviv 69978

[2] Wise Observatory, School of Physics and Astronomy, Tel Aviv University, Tel Aviv 69978, Israel

We employ optical and UV observations to present SEDs for two reverberation-mapped samples of super-Eddington and sub-Eddington AGN with similar luminosity distributions. The samples are fitted with accretion disc models in order to look for SED differences that depend on the Eddington ratio. The fitting takes into account measured BH mass and accretion rates, BH spin and intrinsic reddening of the sources. All objects in both groups can be fitted by thin AD models over the range 0.2-1 μm with reddening as a free parameter. The intrinsic reddening required to fit the data are relatively small, E(B-V)$\leq$ 0.2 mag, except for one source. Super-Eddington AGN seem to require more reddening. The distribution of E(B-V) is similar to what is observed in larger AGN samples. The best fit disc models recover very well the BH mass and accretion for the two groups. However, the SEDs are very different, with super-Eddington sources requiring much more luminous far-UV continuum. The exact amount depends on the possible saturation of the UV radiation in slim discs. In particular, we derive for the super-Eddington sources a typical bolometric correction at 5100Å of 60–150 compared with a median of $\sim$20 for the sub-Eddington AGN. The measured torus luminosity relative to λL_λ(5100Å) are similar in both groups. The α_{OX} distribution is similar too. However, we find extremely small torus covering factors for super-Eddington sources, an order of magnitude smaller than those of sub-Eddington AGN. The small differences between the groups regarding the spectral range 0.2-22 μm, and the significant differences related to the part of the SED that we cannot observe may be consistent with some slim disc models. An alternative explanation is that present day slim-disc models over-estimate the far UV luminosity of such objects by a large amount.

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E-mail contact: nuria@wise.tau.ac.il

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Cargese school "Astrophysical Jets"

Cargèse (Corsica), France
May 23 - June 1, 2016

Webpage: http://www.issibern.ch/cargese2016
Email: beckmann@apc.in2p3.fr

Jets are expected to be present in different astrophysical sources in our Galaxy, as well as in the deep Universe. These sources include Active Galactic Nuclei (AGNs), Gamma-Ray Bursts (GRBs), Microquasars, Young Stellar Objects (YSOs), etc. The spatial and temporal characteristics of these jets differ from one object to another, but there are several phenomena that have common origins and/or explications.

From the particle acceleration point of view, as well as from the radiative one, astrophysical jets show striking similarities, but also some differences, especially in terms of the maximal energy the particles reach, their injection rate, their close environment, and their temporal evolution. From the instrumental point of view, we are currently witnessing a golden era of high-energy astronomy - both space based and ground based - and some projects for the future are already foreseen to take over in the same domain, as well as in closely related fields, potentially providing further constraints to the acceleration and radiation processes.

In order to maximize the scientific return of such wealth of data for the high energy astrophysical community, we propose a school addressed to Ph.D. students and young post-docs. By taking advantage of lecturers, experts in the different topics covered by the school, we would like to stimulate the students to broaden their scientific horizons and to develop the capability to tackle a problem from a different perspective with respect to what they usually are doing or recently did during their Ph.D.

School topics:

- Accretion and Outflows
- Particle Acceleration
- Radiation Processes
- Jet Physics and Simulations
- Multi-messenger Approach
- Active Galactic Nuclei
- Gamma-Ray Bursts
- X-ray Binaries and Microquasars
- Young Stellar Objects
- Future Experiments

Preliminary list of speakers: V. Beckmann (APC Paris, France), B. Cerutti (IPAG Grenoble, France), S. Corbel (Univ. Paris Diderot, France), J. Ferreira (IPAG Grenoble, France), E. Gallo (University of Michigan, USA), G. Ghirlanda (INAF OAB Merate, Italy), G. Ghisellini (INAF OAB Merate, Italy), D. Götz (CEA Saclay, France), J. Kirk (MPI Munich, Germany), S. Komissarov (University of Leeds, UK), K. Kosack (CEA Saclay, France), S. Markoff (UvA, The Netherlands), S. Piranomonte (INAF OAR Roma, Italy), T. Ray (DIAS, Dublin, Ireland), J. Rodriguez (CEA Saclay, France), L. Stella (INAF OAR Roma, Italy)

Registration deadline: March 6, 2016

Special Announcements

Fizeau exchange visitors program - call for applications

2016-02-10

The Fizeau exchange visitors program in optical interferometry funds (travel and accommodation) visits of researchers to an institute of his/her choice (within the European Community) to perform collaborative work and training on one of the active topics of the European Interferometry Initiative. The visits will typically last for one month, and strengthen the network of astronomers engaged in technical, scientific and training work on optical/infrared interferometry. The program is open for all levels of astronomers (Ph.D. students to tenured staff). non-EU based missions will only be funded if considered essential by the Fizeau Committee. Applicants are strongly encouraged to seek also partial support from their home or host institutions.

The **deadline for applications is March 15**. Fellowships can be awarded for missions starting in May.

Further informations and application forms can be found at www.european-interferometry.eu

The program is funded by OPTICON/FP7.

Please distribute this message also to potentially interested colleagues outside of your community!

Looking forward to your applications,
Josef Hron & Laszlo Mosoni
(for the European Interferometry Initiative)

E-mail contact: fizeau@european-interferometry.eu