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

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.

Janine van Eymeren

Abstracts of recently accepted papers

Identifications and Photometric Redshifts of the 2 Ms *Chandra* Deep Field-South Sources

B. Luo[1], W. N. Brandt[1], Y. Q. Xue[1], M. Brusa[2,3], D. M. Alexander[4], F. E. Bauer[5,6], A. Comastri[7], A. Koekemoer[8], B. D. Lehmer[4,9,10], V. Mainieri[11], D. A. Rafferty[1], D. P. Schneider[1], J. D. Silverman[12], and C. Vignali[13]

[1]Department of Astronomy & Astrophysics, 525 Davey Lab, The Pennsylvania State University, University Park, PA 16802, USA
[2]Max-Planck-Institut für Extraterrestrische Physik, Giessenbachstrasse, D-85748 Garching b. München, Germany
[3]University of Maryland, Baltimore County, 1000 Hilltop Circle, Baltimore, MD 21250, USA
[4]Department of Physics, Durham University, Durham, DH1 3LE, UK
[5]Space Science Institute, 4750 Walnut Street, Suite 205, Boulder, Colorado 80301
[6]Pontificia Universidad Católica de Chile, Departamento de Astronomía y Astrofísica, Casilla 306, Santiago 22, Chile
[7]INAF—Osservatorio Astronomico di Bologna, Via Ranzani 1, Bologna, Italy
[8]Space Telescope Science Institute, 3700 San Martin Drive, Baltimore, MD 21218, USA
[9]The Johns Hopkins University, Homewood Campus, Baltimore, MD 21218, USA
[10]NASA Goddard Space Flight Centre, Code 662, Greenbelt, MD 20771, USA
[11]European Southern Observatory, Karl-Schwarzschild-Strasse 2, Garching, D-85748, Germany
[12]Institute for the Physics and Mathematics of the Universe (IPMU), University of Tokyo, Kashiwanoha 5-1-5, Kashiwa, Chiba 277-8568, Japan
[13]Universitá di Bologna, Via Ranzani 1, Bologna, Italy

We present reliable multiwavelength identifications and high-quality photometric redshifts for the 462 X-ray sources in the $\approx$ 2 Ms *Chandra* Deep Field-South survey. Source identifications are carried out using deep optical–to–radio multiwavelength catalogs, and are then combined to create lists of primary and secondary counterparts for the X-ray sources. We identified reliable counterparts for 442 (95.7%) of the X-ray sources, with an expected false-match probability of $\approx$ 6.2%; we also selected four additional likely counterparts. The majority of the other 16 X-ray sources appear to be off-nuclear sources, sources associated with galaxy groups and clusters, high-redshift active galactic nuclei (AGNs), or spurious X-ray sources. A likelihood-ratio method is used for source matching, which effectively reduces the false-match probability at faint magnitudes compared to a simple error-circle matching method. We construct a master photometric catalog for the identified X-ray sources including up to 42 bands of UV–to–infrared data, and then calculate their photometric redshifts (photo-z's). High accuracy in the derived photo-z's is accomplished owing to (1) the up-to-date photometric data covering the full spectral energy distributions (SEDs) of the X-ray sources, (2) more accurate photometric data as a result of source deblending for $\approx$ 10% of the sources in the infrared bands and a few percent in the optical and near-infrared bands, (3) a set of 265 galaxy, AGN, and galaxy/AGN hybrid templates carefully constructed to best represent all possible SEDs, (4) the Zurich Extragalactic Bayesian Redshift Analyzer (ZEBRA) used to derive the photo-z's, which corrects the SED templates to best represent the SEDs of real sources at different redshifts and thus improves the photo-z quality. The reliability of the photo-z's is evaluated using the subsample of 220 sources with secure spectroscopic redshifts. We achieve an accuracy of $|\Delta z|/(1+z) \approx 1\%$ and an outlier [with $|\Delta z|/(1+z) > 0.15$] fraction of $\approx 1.4\%$ for sources with spectroscopic redshifts. We performed blind tests to derive a more realistic estimate of the photo-z quality for sources without spectroscopic redshifts. We expect there are $\approx$ 9% outliers for the relatively brighter sources ($R < 26$), and the outlier fraction will increase to $\approx$ 15–25% for the fainter sources ($R > 26$). The typical photo-z accuracy is $\approx$ 6–7%. The outlier fraction and photo-z accuracy do not appear to have a redshift dependence (for $z \approx 0$–4). These photo-z's appear to be the best obtained so far for faint X-ray sources, and they have been significantly ($> 50\%$) improved compared to previous estimates of the photo-z's for the X-ray sources in the $\approx$ 2 Ms *Chandra* Deep Field-North and $\approx$ 1 Ms *Chandra* Deep Field-South.

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example:

E-mail contact: lbin@astro.psu.edu,
Preprint available at http://arxiv.org/abs/1002.3154 . Catalogs may be requested from lbin@astro.psu.edu

A New Radio Loudness Diagnostic for Active Galaxies: a Radio-To-Mid-Infrared Parameter

M. Meléndez[1,2], S.B. Kraemer[1,3] and H.R. Schmitt[4,5]

[1] Astrophysics Science Division, NASA Goddard Space Flight Center, Greenbelt, MD, 20771, USA
[2] Department of Physics and Astronomy, Johns Hopkins University, Baltimore, MD, 21218, USA
[3] Institute for Astrophysics and Computational Sciences, Department of Physics, The Catholic University of America, Washington, DC, 20064, USA
[4] Remote Sensing Division, Naval Research Laboratory, Washington, DC, 20375, USA
[5] Interferometrics, Inc., Herndon, VA, 20171, USA

We have studied the relationship between the nuclear (high-resolution) radio emission, at 8.4 GHz (3.6 cm) and 1.4 GHz (20 cm), the [O IV] λ25.89 μm, [Ne III] λ15.56 μm and [Ne II] λ12.81 μm emission lines and the black hole mass accretion rate for a sample of Seyfert galaxies. In order to characterize the radio contribution for the Seyfert nuclei we used the 8.4GHz/[O IV] ratio, assuming that [O IV] scales with the luminosity of the AGN. From this we find that Seyfert 1's (i.e., Seyfert 1.0's, 1.2's, and 1.5's) and Seyfert 2's (i.e., Seyfert 1.8's, 1.9's, and 2.0's) have similar radio contributions, relative to the AGN. On the other hand, sources in which the [Ne II] emission is dominated either by the AGN or star formation have statistically different radio contributions, with star formation dominated sources more "radio loud", by a factor of ~ 2.8 on average, than AGN dominated sources. We show that star formation dominated sources with relatively larger radio contribution have smaller mass accretion rates. Overall, we suggest that 8.4GHz/[O IV], or alternatively, 1.4GHz/[O IV] ratios, can be used to characterize the radio contribution, relative to the AGN, without the limitation of previous methods that rely on optical observables.

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E-mail contact: marcio.b.melendez@nasa.gov,
preprint available at http://arxiv.org/abs/1003.2984

Which radio galaxies can make the highest-energy cosmic rays?

M.J. Hardcastle

School of Physics, Astronomy and Mathematics, University of Hertfordshire, College Lane, Hatfield, Hertfordshire AL10 9AB

Numerous authors have suggested that the ultra-high energy cosmic rays (UHECR) detected by the Pierre Auger Observatory and other cosmic-ray telescopes may be accelerated in the nuclei, jets or lobes of radio galaxies. Here I focus on stochastic acceleration in the lobes. I show that the requirement that they accelerate protons to the highest observed energies places constraints on the observable properties of radio lobes that are satisfied by a relatively small number of objects within the

Greisen-Zat'sepin-Kuzmin (GZK) cutoff; if UHECR are protons and are accelerated within radio lobes, their sources are probably already known and catalogued radio galaxies. I show that lobe acceleration also implies a (charge-dependent) upper energy limit on the UHECR that can be produced in this way; if lobes are the dominant accelerators in the local universe and if UHECR are predominantly protons, we are unlikely to see cosmic rays much higher in energy than those we have already observed. I comment on the viability of the stochastic acceleration mechanism and the likely composition of cosmic rays accelerated in this way, based on our current understanding of the contents of the large-scale lobes of radio galaxies, and finally discuss the implications of stochastic lobe acceleration for the future of cosmic ray astronomy.

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E-mail contact: m.j.hardcastle@herts.ac.uk,
preprint available at arXiv.org

A polar+equatorial wind model for broad absorption line quasars: 1. Fitting the CIV BAL profiles

Benoit Borguet[1] **and Damien Hutsemékers**[1]

[1] IA Universit de Lige, Alle du 6 Aot 17, 4000 Lige, Belgium

Despite all the studies, the geometry of the wind at the origin of the blueshifted broad absorption lines (BAL) observed in nearly 20% of quasars still remains a matter of debate. We want to see if a two-component polar+equatorial wind geometry can reproduce the typical BAL profiles observed in these objects. We built a Monte Carlo radiative transfer code (called MCRT) to simulate the line profiles formed in a polar+equatorial wind in which the photons, emitted from a spherically symmetric core are resonantly scattered. Our goal is to reproduce typical CIV line profiles observed in BAL quasars and to identify the parameters governing the line profiles. The two-component wind model appears to be efficient in reproducing the BAL profiles from the P Cygni-type profiles to the more complex ones. Some profiles can also be reproduced with a pole-on view. Our simulations provide evidence of a high-velocity rotation of the wind around the polar axis in BAL quasars with non P Cygni-type line profiles.

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E-mail contact: b.borguet@ulg.ac.be, benbo@vt.edu,
preprint available at Preprints.html

Centaurus A: morphology and kinematics of the atomic hydrogen

C. Struve[1,2]**, T. A. Oosterloo**[1,2]**, R. Morganti**[1,2] **and L. Saripalli**[3,4]

[1] Netherlands Institute for Radio Astronomy, Postbus 2, 7990 AA, Dwingeloo, The Netherlands
[2] Kapteyn Institute, University of Groningen, Landleven 12, 9747 AD, Groningen, The Netherlands
[3] Raman Research Institute, CV Raman Avenue, Sadashivanagar, Bangalore 560080, India
[4] CSIRO, Australia Telescope National Facility, PO Box 76, Epping NSW 1710, Australia

We present new ATCA 21-cm line observations of the neutral hydrogen in the nearby radio galaxy Centaurus A. We image in detail (with a resolution down to $7''$, ~ 100 pc) the distribution of H I along the dust lane. Our data have better velocity resolution and better sensitivity than previous observations. The H I extends for a total of ~ 15 kpc. The data, combined with a titled-ring model of the disk, allow to conclude that the kinematics of the H I is that of a regularly rotating, highly warped structure down to the nuclear scale. The parameters (in particular the inclination) of our model are somewhat different from some of the previously proposed models but consistent with what was recently derived from stellar light in a central ring. The model nicely describes also the morphology of the dust lane as observed with Spitzer. There are no indications that *large-scale* anomalies in the kinematics exist that could be related to supplying material for the AGN. Large-scale radial motions do exist, but these are only present at larger radii ($r > 6$ kpc). This unsettled gas is mainly part of a tail/arm like structure. The relatively regular kinematics of the gas in this structure suggests that it is in the process of settling down into the main disk. The presence of this structure further supports the merger/interaction origin of the H I in Cen A. From the structure and kinematics we estimate a timescale of $1.6-3.2\times10^8$ yr since the merging event. No bar structure is needed to describe the kinematics of the H I. The comparison of the timescale derived from the large-scale H I structure and those of the radio structure together with the relative regularity of the H I down to the sub-kpc regions does not suggest a one-to-one correspondence between the merger and the phase of radio activity. Interestingly, the radial motions of the outer regions are such that the projected velocities are *redshifted* compared to the regular orbits. This means that the blueshifted absorption discovered earlier and discussed in our previous paper cannot be caused by out-moving gas at large radius projected onto the centre. Therefore, the interpretation of the blueshifted absorption, together with at least a fraction of the redshifted nuclear absorption, as evidence for a regular inner disk, still holds. Finally, we also report the discovery of two unresolved clouds detected at 5.2 and 11 kpc away (in projection)

from the H I disk. They are likely an other example of left-over of the merger that brought the H I gas.

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E-mail contact: struve@astron.nl,
preprint available at http://arxiv.org/abs/1003.3250

An H I absorbing circumnuclear disk in Cygnus A

C. Struve[1,2] **and J. E. Conway**[3]

[1] Netherlands Institute for Radio Astronomy, Postbus 2, 7990 AA, Dwingeloo, The Netherlands
[2] Kapteyn Institute, University of Groningen, Landleven 12, 9747 AD, Groningen, The Netherlands
[3] Onsala Space Observatory, SE-439 92 Onsala, Sweden

We present Very Long Baseline Array (VLBA) H I absorption observations of the core region of the powerful radio galaxy Cygnus A. These data show both broad (FWHM $= 231 \pm 21$km s^{-1}) and narrow (FWHM $<$ 30km s^{-1}) velocity width absorption components. The broad velocity absorption shows high opacity on the counter-jet, low opacity against the core and no absorption on the jet side. We argue that these results are most naturally explained by a circumnuclear H I absorbing disk orientated roughly perpendicular to the jet axis. We estimate that the H I absorbing gas lies at a radius of $\sim$ 80 pc has a scale height of about 20 pc, density $n > 10^4$ cm^{-3} and total column density in the range $10^{23} - 10^{24}$ cm^{-2}. Models in which the HI absorption is primarily from an atomic or a molecular gas phase can both fit our data. Modelling taking into account the effective beam shows that the broad H I absorbing gas component does not cover the radio core in Cygnus A and therefore does not contribute to the gas column that blocks our view of the hidden quasar nucleus. If however Cygnus A were observed from a different direction, disk gas on $\sim$ 100pc radius scales would contribute significantly to the nuclear column density, implying that in some radio galaxies gas on these scales may contribute to the obscuration of the central engine. We argue that the circumnuclear torus in Cygnus A contains too little mass to power the AGN over $> 10^7$ yr but that material in the outer H I absorbing gas disk can provide a reservoir to fuel the AGN and replenish torus clouds. The second narrow H I absorption component is significantly redshifted (by 186km s^{-1}) with respect to the systemic velocity and probably traces infalling gas which will ultimately fuel the source. This component could arise either within a tidal tail structure associated with a recent (minor) merger or be associated with an observed infalling giant molecular cloud.

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E-mail contact: struve@astron.nl,
preprint available at http://arxiv.org/abs/0910.5705

The Role of Mergers in Early-type Galaxy Evolution and Black Hole Growth

Kevin Schawinski,[1,2,3] **Nathan Dowlin,**[2,3] **Daniel Thomas,**[4] **C. Megan Urry**[2,3,5] **and Edward Edmondson**[4]

[1] Einstein Fellow
[2] Department of Physics, Yale University, New Haven, CT 06511, U.S.A.
[3] Yale Center for Astronomy and Astrophysics, Yale University, P.O. Box 208121, New Haven, CT 06520, U.S.A. [4] Institute of Cosmology and Gravitation, University of Portsmouth, Mercantile House, Hampshire Terrace, Portsmouth, PO1 2EG, UK [5] Department of Astronomy, Yale University, New Haven, CT 06511, U.S.A.

Models of galaxy formation invoke the major merger of gas-rich progenitor galaxies as the trigger for significant phases of black hole growth and the associated feedback that suppresses star formation to create red spheroidal remnants. However, the observational evidence for the connection between mergers and active galactic nucleus (AGN) phases is not clear. We analyze a sample of low-mass early-type galaxies known to be in the process of migrating from the blue cloud to the red sequence via an AGN phase in the green valley. Using deeper imaging from SDSS Stripe 82, we show that the fraction of objects with major morphological disturbances is high during the early starburst phase, but declines rapidly to the background level seen in quiescent early-type galaxies by the time of substantial AGN radiation several hundred Myr after the starburst. This observation empirically links the AGN activity in low-redshift early-type galaxies to a significant merger event in the recent past. The large time delay between the merger-driven starburst and the peak of AGN activity allows for the merger features to decay to the background and hence may explain the weak link between merger features and AGN activity in the literature.

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E-mail contact: kevin.schawinski@yale.edu,
preprint available at Preprints.html

The Evolution of Quasar CIV and SiIV Broad Absorption Lines Over Multi-Year Time Scales

Robert R. Gibson[1,2], W. N. Brandt[2], S. C. Gallagher[3], Paul C. Hewett[4], Donald P. Schneider[2]

[1] Department of Astronomy, University of Washington, Box 351580, Seattle, WA 98195, USA
[2] Department of Astronomy and Astrophysics, Pennsylvania State University, 525 Davey Laboratory, University Park, PA 16802
[3] Department of Physics and Astronomy, The University of Western Ontario, 1151 Richmond Street, London, ON N6A 3K7, Canada
[4] Institute of Astronomy, University of Cambridge, Cambridge CB3 0HA

We investigate the variability of C IV $\lambda1549$ broad absorption line (BAL) troughs over rest-frame time scales of up to $\approx$7 yr in 14 quasars at redshifts $z \gtrsim 2.1$. For 9 sources at sufficiently high redshift, we also compare C IV and Si IV $\lambda1400$ absorption variation. We compare shorter- and longer-term variability using spectra from up to four different epochs per source and find complex patterns of variation in the sample overall. The scatter in the change of absorption equivalent width (EW), ΔEW, increases with the time between observations. BALs do not, in general, strengthen or weaken monotonically, and variation observed over shorter ($\lesssim$months) time scales is not predictive of multi-year variation. We find no evidence for asymmetry in the distribution of ΔEW that would indicate that BALs form and decay on different time scales, and we constrain the typical BAL lifetime to be $\gtrsim$30 yr. The BAL absorption for one source, LBQS 0022+0150, has weakened and may now be classified as a mini-BAL. Another source, 1235+1453, shows evidence of variable, blue continuum emission that is relatively unabsorbed by the BAL outflow. C IV and Si IV BAL shape changes are related in at least some sources. Given their high velocities, BAL outflows apparently traverse large spatial regions and may interact with parsec-scale structures such as an obscuring torus. Assuming BAL outflows are launched from a rotating accretion disk, notable azimuthal symmetry is required in the outflow to explain the relatively small changes observed in velocity structure over times up to 7 yr.

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E-mail contact: rgibson@astro.washington.edu,
preprint available at IOP

The outflow in Mrk 509: A method to calibrate XMM-Newton EPIC-pn and RGS

R.G. Detmers[1], J.S. Kaastra[1], 2, E. Costantini[1], F. Verbunt[2], M. Cappi[3] and C. de Vries[2]

[1] SRON Netherlands Institute for Space Research, Sorbonnelaan 2, 3584 CA Utrecht, The Netherlands
[2] Astronomical Institute, University of Utrecht, Postbus 80000, 3508 TA Utrecht, The Netherlands
[3] INAF-IASF Bologna, Via Gobetti 101, I-40129 Bologna, Italy

We have analyzed three XMM-Newton observations of the Seyfert 1 galaxy Mrk 509, with the goal to detect small variations in the ionized outflow properties. Such measurements are limited by the quality of the cross-calibration between RGS, the best instrument to characterize the spectrum, and EPIC-pn, the best instrument to characterize the variability. For all three observations we are able to improve the relative calibration of RGS and pn consistently to 4 outflow components and, thanks to our accurate cross-calibration we are able to detect small differences in the ionization parameter and column density in the highest ionized component of the outflow. This constrains the location of this component of the outflow to within 0.5 pc of the central source. Our method for modeling the relative effective area is not restricted to just this source and can in principle be extended to other types of sources as well.

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E-mail contact: r.g.detmers@sron.nl,
preprint available at Preprints.html

Star-formation in the central kpc of the starburst/LINER galaxy NGC1614

E. Olsson[1], S. Aalto[1], M. Thomasson[1], R. J. Beswick[2]

[1] Chalmers University of Technology, Department of Radio and Space Science, Onsala Space Observatory, SE-43992, Onsala, Sweden
[2] Jodrell Bank Centre for Astrophysics, School of Physics and Astronomy, The University of Manchester,M13 9PL, UK

A high angular resolution, multi-wavelength study of the LINER galaxy NGC 1614 has been carried out. OVRO CO 1-0 observations are presented together with extensive multi-frequency radio continuum and HI absorption observations with the VLA and MERLIN. Toward the center of NGC 1614, we have detected a ring of radio continuum emission with a radius of 300 pc. This ring is coincident with previous radio and Paschen-α observations. The dynamical mass of the ring based on HI absorption is 3.1×10^9 $M_\odot$. The peak of the integrated CO 1-0 emission is shifted by $1''$to the north-west of the ring center and

a significant fraction of the CO emission is associated with a crossing dust lane. An upper limit to the molecular gas mass in the ring region is $\sim 1.7\times10^9$ $M_\odot$. Inside the ring, there is a north to south elongated 1.4 GHz radio continuum feature with a nuclear peak. This peak is also seen in the 5 GHz radio continuum and in the CO. We suggest that the R=300 pc star forming ring represents the radius of a dynamical resonance - as an alternative to the scenario that the starburst is propagating outwards from the center into a molecular ring. The ring-like appearance probably part of a spiral structure. Substantial amounts of molecular gas have passed the radius of the ring and reached the nuclear region. The nuclear peak seen in 5GHz radio continuum and CO is likely related to previous star formation, where all molecular gas was not consumed. The LINER-like optical spectrum observed in NGC 1614 may be due to nuclear starburst activity, and not to an Active Galactic Nucleus (AGN). Although the presence of an AGN cannot be excluded.

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E-mail contact: Robert.Beswick@manchester.ac.uk,
preprint available at http://arxiv.org/abs/1003.2903

Discovery of an unusual new radio source in the star-forming galaxy M82: Faint supernova, supermassive blackhole, or an extra-galactic microquasar?

T. W. B. Muxlow[1], R. J. Beswick[1], S. T. Garrington[1], A. Pedlar[1], D. M. Fenech[2], M. K. Argo[3], J. van Eymeren[1], M. Ward[4], A. Zezas[5], 6, A. Brunthaler[7]

[1]Jodrell Bank Centre for Astrophysics, School of Physics and Astronomy, The University of Manchester, Oxford Road, Manchester, M13 9PL

[2]Department of Physics and Astronomy, University College London, Gower Street, London WC1E 6BT

[3]ICRAR - Curtin Institute of Radio Astronomy, Curtin University of Technology, Bentley, Perth, WA 6845, Australia

[4]Department of Physics, University of Durham, South Road, Durham, DH1 3LE

[5]IESL, Foundation for Research and Technology, 71110 Heraklion, Crete, Greece

[6]Harvard Centre for Astrophysics, 60 Garden Street, Cambridge, MA 02138, USA

[7]Max-Planck-Institut für Radioastronomie, Auf dem Hügel 69, 53121 Bonn, Germany

A faint new radio source has been detected in the nuclear region of the starburst galaxy M82 using MERLIN radio observations designed to monitor the flux density evolution of the recent bright supernova SN 2008iz. This new source was initially identified in observations made between 1-5th May 2009 but had not been present in observations made one week earlier, or in any previous observations of M82. In this paper we report the discovery of this new source and monitoring of its evolution over its first 9 months of existence. The true nature of this new source remains unclear, and we discuss whether this source may be an unusual and faint supernova, a supermassive blackhole associated with the nucleus of M82, or intriguingly the first detection of radio emission from an extragalactic microquasar.

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E-mail contact: Robert.Beswick@manchester.ac.uk,
preprint available at http://arxiv.org/abs/1003.0994

High-velocity-resolution observations of OH main line masers in the M82 starburst

M. K. Argo[1], A. Pedlar[2], R. J. Beswick[2], T. W. B. Muxlow[2], D. M. Fenech[3]

[1]ICRAR - Curtin Institute of Radio Astronomy, Curtin University of Technology, Bentley, Perth, WA 6845, Australia
[2]Jodrell Bank Centre for Astrophysics, School of Physics and Astronomy, The University of Manchester, Oxford Road, Manchester, M13 9PL
[3]Department of Physics and Astronomy, University College London, Gower Street, London WC1E 6BT

Using the Very Large Array, a series of high-velocity-resolution observations have been made of the M82 starburst at 1.6 GHz. These observations follow up on previous studies of the main line OH maser emission in the central kiloparsec of this starburst region, but with far greater velocity resolution, showing significant velocity structure in some of the maser spots for the first time. A total of 13 masers were detected, including all but one of the previously known sources. While some of these masers are still unresolved in velocity, these new results clearly show velocity structure in spectra from several of the maser regions. Position-velocity plots show good agreement with the distribution of HI including interesting velocity structure on the blueward feature in the west of the starburst which traces the velocity distribution seen in the ionized gas.

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E-mail contact: Robert.Beswick@manchester.ac.uk,
preprint available at http://arxiv.org/abs/1001.4849

Hubble Space Telescope Near Infrared Snapshot Survey of 3CR radio source counterparts III: Radio galaxies and quasars in context

David J. E. Floyd[1,2] David Axon[3,4], Stefi Baum[3], Alessandro Capetti[5] Marco Chiaberge[2,6], Juan Madrid[2,7], Christopher P. O'Dea[3], Eric Perlman[8], and William Sparks[2]

[1]AAO/OCIW Magellan Fellow. Current address: School of Physics, University of Melbourne, Victoria 3010, Australia
[2]Space Telescope Science Institute, 3700 San Martin Drive, Baltimore, MD 21218, USA
[3]Department of Physics, Rochester Institute of Technology, 84 Lomb Memorial Drive, Rochester, NY 14623, USA
[4]School of Mathematical & Physical Sciences, University of Sussex, Falmer, Brighton, BN2 9BH, UK
[5]INAF–Osservatorio Astronomico di Torino, Via Osservatorio 20, I-10025 Pino Torinese, Italy
[6]INAF–IRA, Via P. Gobetti 101, I-40129 Bologna, Italy
[7]Centre for Astrophysics & Supercomputing, Swinburne University of Technology P.O. Box 218, Hawthorn, VIC 3122, Australia
[8]Florida Institute of Technology, Physics & Space Sciences Department, 150 W. University Blvd., Melbourne, FL 32901 USA

We compare the near-infrared (NIR) H band photometric and morphological properties of low-z ($z < 0.3$) 3CR radio galaxies with samples of BL Lac object and quasar host galaxies, merger remnants, quiescent elliptical galaxies, and brightest cluster galaxies drawn from the literature. In general the 3CR host galaxies are consistent with luminous ($\sim L^{\star}$) elliptical galaxies. The vast majority of FR II's ($\sim 80\%$) occupy the most massive ellipticals and form a homogeneous population that is comparable to the population of radio-loud quasar (RLQ) host galaxies in the literature. However, a significant minority ($\sim 20\%$) of the 3CR FR II's appears under-luminous with respect to quasar host galaxies. All FR II objects in this faint tail are either unusually red, or appear to be the brightest objects within a group. We discuss the apparent differences between the radio galaxy and RLQ host galaxy populations. RLQs appear to require $> 10^{11}\ M_{\odot}$ host galaxies (and $\sim 10^{9}\ M_{\odot}$ black holes), whereas radio galaxies and RQQs can exist in galaxies down to $\sim 3 \times 10^{10}\ M_{\odot}$. This may be due to biases in the measured quasar host galaxy luminosities or populations studied, or due to a genuine difference in host galaxy. If due to a genuine difference, it would support the idea that radio and optical active galactic nuclei are two separate populations with a significant overlap.

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E-mail contact: dfloyd@unimelb.edu.au,
preprint available at http://arxiv.org/abs/1003.2467

Luminosity-variation independent location of the circum-nuclear, hot dust in NGC 4151

Jorg-Uwe Pott[1,2,3], Matt A. Malkan[2], Moshe Elitzur[4], Andrea M. Ghez[2,5], Tom M. Herbst[1], Rainer Schödel[6], Julien Woillez[3]

[1] Max-Planck-Institut für Astronomie, Königstuhl 17, D-69117 Heidelberg, Germany
[2] Div. of Astronomy & Astrophysics, University of California, Los Angeles, CA 90095-1547, USA
[3] W. M. Keck Observatory, California Association for Research in Astronomy, Kamuela, HI 96743, USA
[4] Dept. of Physics and Astronomy, University of Kentucky, Lexington, KY 40506-0055, USA
[5] Institute of Geophysics and Planetary Physics, University of California, Los Angeles, CA 90095-1565, USA

[6] Instituto de Astrofisica de Andalucia - CSIC, Camino Bajo de Huetor, 50, 18008 Granada, Spain, USA

After recent sensitivity upgrades at the Keck Interferometer (KI), systematic interferometric 2 μm studies of the innermost dust in nearby Seyfert nuclei are within observational reach. Here, we present the analysis of new interferometric data of NGC 4151, discussed in context of the results from recent dust reverberation, spectro-photometric and interferometric campaigns. The complete data set gives a complex picture, in particular the measured visibilities from now three different nights appear to be rather insensitive to the variation of the nuclear luminosity. KI data alone indicate two scenarios: the K-band emission is either dominated to $\sim 90\%$ by size scales smaller than 30 mpc, which falls short of any dust reverberation measurement in NGC 4151 and of theoretical models of circum-nuclear dust distributions. Or contrary, and more likely, the K-band continuum emission is dominated by hot dust (≥ 1300 K) at linear scales of about 50 mpc. The linear size estimate varies by a few tens of percent depending on the exact morphology observed. Our interferometric, deprojected centro-nuclear dust radius estimate of 55 ± 5 mpc is roughly consistent with the earlier published expectations from circum-nuclear, dusty radiative transfer models, and spectro-photometric modeling. However, our data do not support the notion that the dust emission size scale follows the nuclear variability of NGC 4151 as a $R_{\rm dust} \propto L_{\rm nuc}^{0.5}$ scaling relation. Instead variable nuclear activity, lagging, and variable dust response to illumination changes need to be combined to explain the observations.

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E-mail contact: jpott@mpia.de,
preprint available at ftp://ftp.mpia.de/pub/jpott/jpott_N4151.pdf

THE RADIO JET INTERACTION IN NGC 5929: DIRECT DETECTION OF SHOCKED GAS

D.J. Rosario[1], M. Whittle[2], C.H. Nelson[3] and A.S. Wilson[4]

[1] Astronomy Department, University of California, Santa Cruz, CA 95064, USA
[2] Astronomy Department, University of Virginia, Charlottesville, VA 22903, USA
[3] Physics and Astronomy Department, Drake University, Des Moines, IA 50311-4505, USA
[4] Astronomy Department, University of Maryland, College Park, MD 20742, USA

We report on the discovery of kinematic shock signatures associated with a localized radio jet interaction in the merging Seyfert galaxy NGC 5929. We explore the velocity-dependent ionization structure of the gas and find that low-ionization gas at the interaction site is significantly more disturbed than high-ionization gas, which we attribute to a local enhancement of shock ionization due to the influence of the jet. The characteristic width of the broad low-ionization emission is consistent with shock velocities predicted from the ionization conditions of the gas. We interpret the relative prominence of shocks to the high density of gas in the nuclear environment of the galaxy and place some constraints of their importance as feedback mechanisms in Seyferts.

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E-mail contact: rosario@ucolick.org
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Optical Microvariability in Quasars: Spectral Variability

A. Ramírez, D. Dultzin and J.A. de Diego

Instituto de Astronomía de la Universidad Nacional Autónoma de México, Apartado Postal 70-264, 04510 México, D.F., México

We present a method that we developed to discern where the optical microvariability (OM) in quasars originates: in the accretion disk (related with thermal processes), or in the jet (related with non-thermal processes). Analyzing nearly simultaneous observations in three different optical bands of continuum emission, we are able to determine the origin of several isolated OM events. In particular, our method indicates that from 9 events reported by Ramírez et al. (2009), 3 of them are consistent with a thermal origin, 3 to non-thermal, and 3 cannot be discerned. The implications for the emission models of OM are briefly discussed.

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E-mail contact: aramirez@astroscu.unam.mx

Thesis Abstracts

Infrared Spectroscopic Survey of the 12μm Seyfert Galaxies Sample

Silvia Tommasin

Thesis work conducted at: Istituto di Fisica dello Spazio interplanetario - INAF

Current address: IFSI-INAF, Via Fosso del Cavaliere 100, 00133 Roma, Italy

Electronic mail: silvia.tommasin@ifsi-roma.inaf.it

Ph.D dissertation directed by: Dr Luigi Spinoglio, Prof Paolo De Bernardis

Ph.D degree awarded: January 2010

The AGN and their circumnuclear regions are sites of tremendous energy generation, from accretion onto the central super massive black hole (SMBH) and from energetic starbursts in the host galaxy. These processes appear to be connected, at least in the local Universe, through the Magorrian relation (Magorrian et al., 1998, Ferrarese & Merrit, 2000) that implies that the processes of black hole growth - through mass accretion - and bulge formation - through star formation - are linked. Elliptical galaxies with old stellar bulges, nearby quasars and normal galaxies are known to follow the Magorrian relation (Wu & Han, 2001). From our studies, reported in Tommasin et al. (2008) and Tommasin et al. (2010), we found that, while co-existing, the two processes of AGN accretion and star formation do not show any correlation in local Seyfert galaxies, therefore we are led to search the reason of the Magorrian relation in remote ages.

The black hole accretion and the star formation processes are often obscured by large amount of dust, therefore they cannot be observed directly at the optical wavelengths. The most powerful method to study the nature of the obscured sources is through infrared spectroscopic observations. The luminosity of the AGN/starburst systems is reprocessed by the dust, which is heated by both the AGN and the starburst, so the nature of the ionizing processes can be determined only indirectly through the infrared spectroscopy.

Spectroscopical surveys with the *Spitzer* spectrometer have been performed on classical AGN (Weedman et al., 2005), ULIRGs (Armus et al., 2007), Seyfert's (e.g., Buchanan et al., 2006, Wu et al., 2009). Following the predictions of Spinoglio & Malkan (1992) and the *ISO* SWS data of Sturm et al. (2002), the most powerful AGN diagnostics are confirmed to be the ratios between forbidden fine structure lines, such as [NeV] and [OIV], ionized in the narrow line regions by the high ionization field of the AGN, to [NeII] and [SiII], with a relative low ionizing potential due to stellar processes (Meléndez et al., 2008a, Tommasin et al., 2008, Tommasin et al., 2010). As already shown by Genzel et al. (1998) in their *ISO* SWS survey, the Polycyclic Aromatic Hydrocarbons are confirmed to be strong in the star formation component, and therefore are optimal to indicate the starburst power (Weedman et al., 2005, Wu et al., 2009).

My thesis work develops in this context: I have used the mid-IR spectroscopy with the IRS onboard the *Spitzer Space Observatory* to disentangle the AGN and starburst components in the total source emission. I reduced and analyzed the high resolution (R$\sim$600) spectra of a complete sample of Seyfert galaxies. For the first time a mid-IR survey of a complete sample of Seyfert galaxies of the local Universe has been performed, allowing a statistical study of the properties of these sources. The measured mid-IR properties have been used to analyse the AGN and starburst components with respect to the total continuum mid-IR emission. The statistical relevance of this work allowed the prediction of the semi-analytical models, that I developed, to estimate the AGN percentage in the observed Seyferts of the sample, based on the AGN properties found. The luminosity functions of the mid-IR lines and the AGN accretion power in the local universe have been derived.

The two processes of AGN accretion and star formation are essential in driving galaxy evolution, simply because they generate most of the available energy that is radiated from galaxies. The study of these two phenomena along galaxy evolution is therefore fundamental. The *Spitzer* spectroscopy presented here is paving the way for a thorough understanding of the zero redshift galaxy population and future observations of distant populations at higher redshift will have to be compared with this study to better understand galaxy evolution. With the *Spitzer* spectroscopical surveys (5-40μm) and the incoming observations by *Herschel* (50-670μm), it is possible to study the mid- and far-IR properties of the local universe. In the next future, submillimeter spectroscopy with the *ALMA* telescope (300μm-3mm) (Maiolino, 2008) and mid-to-far infrared spectroscopic surveys with the *Spica* mission (20-200μm) (Spinoglio et al., 2009) will allow to measure accretion and star formation in galaxies at high redshift to understand galaxy evolution.

Meetings

10th EVN Symposium 2010: VLBI and the new generation of radio arrays

Manchester, UK
September 20th-24th, 2010

Webpage: http://www.jodrellbank.manchester.ac.uk/meetings/evn2010
Email: evnsymp2010@jb.man.ac.uk

SCIENTIFIC RATIONALE: Jodrell Bank Centre for Astrophysics and the University of Manchester, on behalf of the European VLBI Consortium, will host the 10th European VLBI Network Symposium from September 20th to 24th, 2010. The Symposium will be held at the University of Manchester, UK.

At this conference the latest scientific results and technical developments from VLBI and e-VLBI results will be reported. The timing of this meeting coincides with the development of, and first results from a number of new and upgraded radio facilities around the globe, such as e-MERLIN, LOFAR, EVLA, ALMA, and the SKA pathfinders ASKAP and MeerKAT. This meeting will incorporate some of the firs results from these new instruments, in addition to the unique scientific and technical contribution of VLBI in this new era of radio astronomy.

PLANNED SCIENCE SESSIONS will include: Life cycle of matter in stars and galaxies; AGN and cosmic star-formation; Extreme Astrophysics; Astrometry, Geodesy, space and planetary science; and Techniques & developments.

VENUE: The conference will be held in the University of Manchester's conference venue, the Weston Building, which is situated in city centre of Manchester. Manchester itself is a vibrant city with ample attractions and amenities for all visitors. Block bookings of rooms for the duration of the meeting at the conference venue itself. Further information regarding this conference as well as specific details regarding the venue and accommodation will available shortly on the conference website and in subsequent announcements. This meeting will also incorporate the EVN Users meeting and a trip to Jodrell Bank Observatory.

Jobs

Postdoctoral and PhD Research Positions

Instituto de Astrofísica de Andalucía (CSIC), Granada, Spain
22 February 2010

The Relativistic Jets and Blazars group at the Instituto de Astrofísica de Andalucía (CSIC) invites applications for *one two-year postdoctoral research position* and *one four-year PhD position*.

Our research group is focussed on the study of relativistic jets commonly present in active galactic nuclei. In particular we are interested in obtaining a better understanding of the role played by the magnetic field in the jet formation, dynamics, and high energy emission. This research is carried out through observations at multiple wavelengths, from radio -mainly VLBI- to optical, and higher energies. The interpretation of the observational results is performed through comparison with numerical models of the non-thermal emission from these objects.

We are therefore looking for a postdoctoral researcher with experience in either observations or simulations of relativistic jets, mainly in AGN, although experience in other sources of relativistic jets, like GRBs or microquasars, would be also helpful. Our main observational expertise is that of VLBI observations, specially in polarimetric mode and at high frequencies, so any experience in radio interferometry would be highly valuable, but not necessary. Our simulations are aimed to obtain synthetic emission maps/light curves that can be directly compared with observations, so to better constrain the physical properties of the source, specially the magnetic field. Hence, any knowledge of RMHD, synchrotron, and inverse Compton emission would be very useful.

Interested candidates in the postdoctoral position should have (or will shortly satisfy the requirements for) a PhD in Astrophysics or related disciplines. Applicants should send curriculum vita, including complete publication list, a cover letter describing your research interest, and how do you think it suits to our research, and three letters of recommendation to be sent directly to Dr. Gómez (jlgomez@iaa.es).

Reviewing of both applications will start in late March/April 2010 and will continue until the positions are filled.

For further information please contact Dr. Gómez at jlgomez@iaa.es (http://www.iaa.csic.es/∼jlgomez).