Active Galaxies Newsletter	*An electronic publication dedicated to the observation and theory of active galaxies*
No. 168 — March 2011	Editor: Melanie Gendre (agnews@manchester.ac.uk)

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.

Melanie Gendre

Abstracts of recently accepted papers

Radio structure of the blazar 1156+295 with sub-pc resolution

W. Zhao[1,2], X.-Y. Hong[1], T. An[1], D.-R. Jiang[1], Jun-Hui Zhao[3], L. I. Gurvits[4,5] and J. Yang[4]

[1] Shanghai Astronomical Observatory, CAS, 80 Nandan Road, 200030 Shanghai, P.R. China
[2] Graduate University of the Chinese Academy of Sciences, 100049 Beijing, P.R. China
[3] Harvard-Smithsonian Center for Astrophysics, 60 Garden Street, MS 78, Cambridge, MA 02138, USA
[4] Joint Institute for VLBI in Europe, Postbus 2, 7990 AA Dwingeloo The Netherlands
[5] Institute of Space and Astronautical Science, Japan Aerospace Exploration Agency, 3-1-1 Yoshinodai Chuo-ku, Sagamihara, Kanagawa 252-5210, Japan

1156+295 is a flat-spectrum quasar which is loud at radio and γ-ray. Previous observations of the source revealed a radio morphology on pc to kpc scales consistent with a helical jet model. In our present research, this source was observed with the VLBA at 86, 43 and 15 GHz on four epochs from 10 May 2003 to 13 March 2005 aiming at studying the structure of the innermost jet in order to understand the relation between the helical structure and the astrophysical processes in the central engine.

The observations with the highest resolution of 0.08 mas ($\sim$0.5 pc) were carried out in a full polarization mode. A core-jet structure with six jet components is identified. Three jet components are detected for the first time. The apparent transverse velocities of the six jet components derived from proper motion measurements are in the range between 3.6 c and 11.6 c, suggesting that highly relativistic jet plasma moves in the direction close to the line of sight. The overall jet shape shows oscillatory morphology with multiple curvatures on pc scales which might be indicative of a helical pattern.

Models of helical jet are discussed on the basis of both Kelvin-Helmholtz (K-H) instability and jet precession. The K-H instability model shows better agreement with the observed data. The overall radio structure on the scale from sub-pc to kpc appears to be fitted with a hydrodynamic model with the fundamental helical mode in Kelvin-Helmholtz (K-H) instability. This helical

mode with an initial characteristic wavelength of λ_0=0.2 pc is excited at the base of the jet on the scale of 0.005 pc (or $10^3 R_s$, the typical size of the broad line region for a super massive black hole of $4.3 \times 10^8 M_\odot$). A presessing jet model can also fit the observed jet structure on the scale between 10 pc and 300 pc. However, additional astrophysical processes may be required for the presessing jet model in order to explain the bendings on the inner jet structure (1 to 10 pc) and re-collimation of the large scale jet outflow (>300 pc).

Accepted by A&A

E-mail contact: weizhao@shao.ac.cn,
preprint available at http://arxiv.org/abs/1102.3046

The Effect of Environment on the Formation of Hα Filaments and Cool Cores in Galaxy Groups and Clusters

Michael McDonald[1], Sylvain Veilleuxr[1] and Richard Mushotzky[1]

[1] Department of Astronomy, University of Maryland, College Park, MD 20742

We present the results of a combined X-ray and Hα study of 10 galaxy groups and 17 galaxy clusters using the *Chandra X-ray Observatory* and the Maryland Magellan Tunable Filter. We find no difference in the morphology or detection frequency of Hα filaments in groups versus clusters, over the mass range $10^{13} < M_{500} < 10^{15} M_\odot$. The detection frequency of Hα emission is shown to be only weakly dependent on the total mass of the system, at the 52% confidence level. In contrast, we find that the presence of Hα filaments is strongly correlated with both the global (89% confidence level) and core (84%) ICM entropy, as well as the X-ray cooling rate (72%). The Hα filaments are therefore an excellent proxy for the cooling ICM. The Hα filaments are more strongly correlated with the cooling properties of the ICM than with the radio properties of the BCG; this further supports the scenario where these filaments are directly associated with a thermally-unstable, rapidly cooling ICM, rather than radio bubbles. The ICM cooling efficiency, defined as the X-ray cooling rate per unit gas mass, is shown to correlate with the total system mass, indicating that groups are more efficient at cooling than clusters. This result implies that, in systems with cool cores, AGN feedback scales with the total mass of the system, in agreement with earlier suggestions.

Accepted by ApJ

E-mail contact: mcdonald@astro.umd.edu
preprint available at arXiv:1102.1972

Outflow in Overlooked Luminous Quasar: Subaru Observations of AKARI J1757+5907

Kentaro Aoki[1], Shinki Oyabu[1,2], Jay P. Dunn[3], Nahum Arav[3], Doug Edmonds[3], Kirk T. Korista[4], Hideo Matsuhara[5] and Yoshiki Toba[5]

[1] Subaru Telescope, National Astronomical Observatory of Japan, 650 North A'ohoku Place, Hilo, HI 96720, U.S.A.
[2] Graduate School of Science, Nagoya University, Chikusa-ku, Nagoya 464-8602, Japan
[3] Department of Physics, Virginia Tech, Blacksburg, VA 24061, U.S.A.
[4] Department of Physics, Western Michigan University, Kalamazoo, MI 49008-5252, U.S.A.
[5] Institute of Space and Astronautical Science, Japan Aerospace Exploration Agency, 3-1-1 Yoshinodai, Sagamihara, Kanagawa 229-851

We present Subaru observations of the newly discovered luminous quasar AKARI J1757+5907, which shows an absorption outflow in its spectrum. The absorption consists of 9 distinct troughs, and our analysis focuses on the troughs at ~ -1000 km s^{-1} for which we can measure accurate column densities of He I*, Fe II and Mg II. We use photoionization models to constrain the ionization parameter, total hydrogen column density, and the number density of the outflowing gas. These constraints yield lower limits for the distance, mass flow rate and kinetic luminosity for the outflow of 3.7 kpc, 70 $M_\odot$ yr^{-1}, and 2.0×10^{43} ergs s^{-1}, respectively. Such mass flow rate value can contribute significantly to the metal enrichment of the intra-cluster medium. We find that this moderate velocity outflow is similar to those recently discovered in massive post-starburst galaxies. Finally,

we describe the scientific potential of future observations targeting this object.

Accepted by PASJ (Subaru special issue)

E-mail contact: kaoki@subaru.naoj.org,
preprint available at arXiv:1101.4340

Unification of Luminous Type 1 Quasars through CIV Emission

Gordon T. Richards[1], Nicholas E. Kruczek[1], S. C. Gallagher[2], Patrick B. Hall[3], Paul C. Hewett[4], Karen M. Leighly[5], Rajesh P. Deo[1], Rachael M. Kratzer[1] and Yue Shen[6]

[1] Department of Physics, Drexel University, 3141 Chestnut Street, Philadelphia, PA 19104.
[2] Department of Physics & Astronomy, The University of Western Ontario, London, ON N6A 3K7, Canada.
[3] Department of Physics and Astronomy, York University, Toronto, Ontario M3J 1P3, Canada.
[4] Institute of Astronomy, Madingley Road, Cambridge CB3 0HA, UK.
[5] Homer L. Dodge Department of Physics and Astronomy, The University of Oklahoma, 440 W. Brooks St., Norman, OK 73019.
[6] Harvard-Smithsonian Center for Astrophysics, 60 Garden Street, MS-51, Cambridge, MA 02138.

Using a sample of ∼30,000 quasars from the 7th Data Release of the Sloan Digital Sky Survey, we explore the range of properties exhibited by high-ionization, broad emission lines, such as CIV λ1549. Specifically we investigate the anti-correlation between continuum luminosity and emission line equivalent width (the Baldwin Effect) and the "blueshifting" of the high-ionization emission lines with respect to low-ionization emission lines. Employing improved redshift determinations from Hewett & Wild, the blueshift of the CIV emission line is found to be nearly ubiquitous, with a mean shift of $\sim 810\,\mathrm{km\,s^{-1}}$ for radio-quiet quasars and $\sim 360\,\mathrm{km\,s^{-1}}$ for radio-loud quasars. The Baldwin Effect is present in both radio-quiet and radio-loud samples. We consider these phenomena within the context of an accretion disk wind model that is modulated by the non-linear correlation between ultraviolet and X-ray continuum luminosity. Composite spectra are constructed as a function of CIV emission line properties in attempt to reveal empirical relationships between different line species and the continuum. Within a two-component disk+wind model of the broad emission line region (BELR), where the wind filters the continuum seen by the disk component, we find that radio-loud quasars are consistent with being dominated by the disk component, while broad absorption line quasars are consistent with being dominated by the wind component. Some radio-quiet objects have emission line features similar to radio-loud quasars; they may simply have insufficient black hole spin to form radio jets. Our results suggest that there could be significant systematic errors in the determination of L_{bol} and black hole mass that make it difficult to place these findings in a more physical context. However, it is possible to classify quasars in a paradigm where the diversity of BELR parameters are due to differences in an accretion disk wind between quasars (and over time); these differences are underlain primarily by the spectral energy distribution, which ultimately must be tied to black hole mass and accretion rate.

Accepted by AJ

E-mail contact: gtr@physics.drexl.edu,
Preprint is available at arXiv:1101.2282

Quasar radio-loudness and the elliptical core problem

Timothy S. Hamilton[1]

[1] Shawnee State University, 940 2nd St., Portsmouth, Ohio 45662, U.S.A

The dichotomy between radio-loud and radio-quiet QSOs is not simply one of host morphology. While spiral galaxies almost exclusively host radio-quiet QSOs, ellipticals can host either radio-louds or radio-quiets. We find that a combination of accretion rate and host scale determines which type of QSO a given elliptical galaxy will host. QSOs with high x-ray luminosities (above $10^{44.5}$ erg s^{-1} at 0.5 keV) are mostly radio-loud. But those with low luminosities divide fairly neatly in size (measured by the half-light radius, r_{e}). Those larger than about 10 kpc are radio-loud, while smaller ones are radio-quiet. It has recently been found that core and coreless ellipticals are also divided near this limit. This implies that for low-luminosity QSOs, radio-louds

are found in core ellipticals, while radio-quiets are in coreless ellipticals and spirals. This segregation also shows up strongly for low-redshift objects, and in general, there is a loss over time of coreless, radio-loud QSOs. Since the presence or absence of a core may be tied to the galactic merger history, we have an evolutionary explanation for the differences between radio-loud and radio-quiet QSOs.

Published 2010 MNRAS, 407, 2393

E-mail contact: thamilton@shawnee.edu,
preprint available at arXiv:1006.0128,
full ADS entry at NASA ADS