Active Galaxies Newsletter	*An electronic publication dedicated to the observation and theory of active galaxies*
No. 51 — June 2001	Editor: Rob Beswick (rb@ast.man.ac.uk)

Abstracts - Thesis Abstracts - Jobs - Meetings

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.
Rob Beswick

Abstracts of recently accepted papers

HST optical spectral index map of the jet of 3C 273

S. Jester [1], H.-J. Röser [1], K. Meisenheimer [1], R. Perley [2] and R. Conway [3]

[1] Max-Planck-Institut für Astronomie, Königstuhl 17, 69117 Heidelberg, Germany
[2] NRAO, P. O. Box 0, Socorro, NM 87801, USA
[3] Jodrell Bank Observatory, Macclesfield, Cheshire, SK11 9DL, UK

We present HST images at 622 nm and 300 nm of the jet in 3C 273 and determine the run of the optical spectral index at $0''.2$ along the jet. The smoothness of spectral index changes shows that the physical conditions are varying smoothly across the jet. There is no correlation between the optical flux and spectral index, as would be expected for relativistic electrons suffering strong cooling due to synchrotron emission. We find no evidence for localized acceleration or loss sites. This suggests that the spectral shape is not changing much throughout the jet. We show that relativistic beaming and/or sub-equipartition magnetic fields cannot remove the discrepancy between light-travel time along the jet and the lifetime of electrons emitting optical synchrotron radiation. We consider this further evidence in favour of a distributed electron acceleration process.

Accepted by Astronomy and Astrophysics

E-mail contact: jester@mpia.de,
preprint available at http://arXiv.org/abs/astro-ph/0104393

Global molecular gas properties of Seyfert galaxies II: Analysis of the results

S. J. Curran[1,2], A. G. Polatidis[1], S. Aalto[1] and R. S. Booth[1]

[1] Onsala Space Observatory, Chalmers University of Technology, S-439 92 Onsala, Sweden
[2] School of Physics, University of New South Wales, Sydney NSW 2052, Australia

We use the data published in Paper I and Curran et al. (2000) to determine the global molecular gas luminosities and distributions in a sample of 22 Seyfert galaxies. From this we find definite differences in the CO to HCN luminosity ratios between the near-by and distant galaxies of the sample. This is perhaps due to a selection effect where we only observe the brightest of the distant sources. With regard to distributions, we find in the near-by (mapped) sample that the CO is usually

much wider distributed than the central telescope beam and that the HCN is considerably more extended beyond the ~ 1 kpc often cited in the literature. In fact this molecule has been detected as far as ≈ 5 kpc from the centre of NGC 1365. We may also have detected a bar in HCN in NGC 5033. Also, using the data to complement the results of Curran (2000a), we find $\frac{L_{\rm CO}}{L_{\rm FIR}}({\rm Sy2}) \approx \frac{L_{\rm CO}}{L_{\rm FIR}}({\rm Sy1})$ i.e. no difference in the molecular gas luminosities between the two main Seyfert classes. In fact we consider it more meaningful to discuss the differences between the near-by and distant sample (irrespective of Seyfert type), although both of these samples may show evidence that much of the far infrared luminosity could arise from an active galactic nucleus as opposed to being predominantly due to vigorous star formation. We do believe, however, that improved statistics would be of little value in distinguishing between these two scenarios and that future high resolution observations are the key to resolving this issue.

Accepted by Astronomy and Astrophysics

E-mail contact: sjc@bat.phys.unsw.edu.au,
preprint available at http://www.oso.chalmers.se/∼curran

Circumnuclear obscuration of the Circinus galaxy by a starburst-radiation supported wall

Ken Ohsuga[1] **and Masayuki Umemura**[2]

[1] Yukawa Institute for Theoretical Physics, Kyoto University, Kyoto 606-8502, Japan
[2] Center for Computational Physics, University of Tsukuba, Tsukuba, Ibaraki 305-8577, Japan

We consider the radiation-hydrodynamical formation of a dusty wall in the circumnuclear regions of the Circinus Seyfert 2 galaxy. We focus on the radiative flux force due to the circumnuclear starburst, the nuclear starburst and the active galactic nucleus (AGN), and analyze the equilibrium configuration and stability of the dusty gas in the circumnuclear regions. The mass distributions used to model the gravitational fields are determined by the observed rotation velocities of the stars and of the gas. Moreover, by using the simple stellar evolution in the circumnuclear starburst, the bolometric luminosity of the starburst is estimated as a function of time. As a result, it is shown that the radiation force by the circumnuclear starburst does play an important role to build up a radiatively-supported dusty wall of ≤ 100 pc, which obscures the circumnuclear regions with A_V of a few magnitudes. It is also found that the age of a circumnuclear starburst when the circumnuclear regions are enshrouded by the dusty wall is constrained to be $\leq 10^8$ yr, which is consistent with the age observationally inferred for the starburst, $4\,10^7$ yr $-1.5\,10^8$ yr.

Accepted by Astronomy and Astrophysics

E-mail contact: ohsuga@yukawa.kyoto-u.ac.jp,
preprint available at http://xxx.lanl.gov/abs/astro-ph/0105263

Multiwavelength Monitoring of the Narrow-Line Seyfert 1 Galaxy Akn 564. I. ASCA Observations and the Variability of the X-ray Spectral Components

T.J. Turner[1,2], **P. Romano**[3], **I.M. George**[1,2], **R. Edelson**[4], **S.J.Collier**[3], **S.Mathur**[3] **and B.M.Peterson**[3].

[1] Joint Center for Astrophysics, Department of Physics, University of Maryland, Baltimore County, 1000 Hilltop Circle, Baltimore, MD 21250
[2] Laboratory for High Energy Astrophysics, Code 660, NASA/Goddard Space Flight Center, Greenbelt, MD 20771
[3] Department of Astronomy, Ohio State University, 140 West 18th Avenue, Columbus, OH 43210

We present a 35 day *ASCA* observation of the Narrow-Line Seyfert 1 galaxy Akn 564, yielding an on-source exposure ~ 1 Ms. The *ASCA* observation was part of a multiwavelength AGN Watch monitoring campaign. The soft X-ray light curve binned to 256 s reveals trough-to-peak flux variations up to a factor of ~ 16 and changes in the fractional amplitude of variability across the observation.

Akn 564 shows small variations in photon index across the observation, with Γ in the range 2.45–2.72. The presence of the soft hump component below 1 keV, previously detected in *ASCA* data, is confirmed. Time-resolved spectroscopy with $\sim$ daily sampling reveals a distinction in the variability of the soft hump and power-law components over a timescale of weeks, with the hump varying by a factor of ~ 6 across the 35-day observation compared to a factor 4 in the power-law. This difference in the long-term amplitudes of variation causes changes in the softness ratio across the observation. Flux variations in the power-law component are measured down to a timescale of ~ 1000 s and accompanying spectral variability suggests the soft hump is not well-correlated with the power-law on such short timescales. However, some correlated events are observed in the soft hump, UV flux and hard X-ray flux when all are sampled daily. No significant UV to X-ray lags are found, with upper limits ~ 1 day.

We detect Fe Kα and a blend of Fe Kβ plus Ni Kα, the line energies indicating an origin in highly ionized gas. Variability

measurements constrain the bulk of the Fe Kα line to originate within $\sim$ a light week of the nucleus. The large EW of the emission lines may be due to high metallicity in NLS1s, supporting some evolutionary models for AGN.

Accepted by The Astrophysical Journal

The QSO - Ultraluminous Infrared Galaxies

S. Veilleux[1], D.-C. Kim[2] and D. B. Sanders[3]

[1] Department of Astronomy, University of Maryland, College Park, MD 20742
[2] Academia Sinica Institute of Astronomy and Astrophysics, Nankang, Taipei, Taiwan
[3] Institute for Astronomy, University of Hawaii, Honolulu, HI 96822

For the past several years, our group has pursued a vigorous ground-based program aimed at understanding the nature of ultraluminous infrared galaxies. We recently published the results from a optical/near-infrared spectroscopic survey of a large statistically complete sample of ultraluminous infrared galaxies (the "IRAS 1-Jy sample"). We now present the results from our recently completed optical/near-infrared imaging survey of the 1-Jy sample. These data provide detailed morphological information on both large scale (e.g., intensity and color profiles, intensity and size of tidal tails and bridges, etc) and small scale (e.g., nuclear separation, presence of bars, etc) that helps us constrain the initial conditions necessary to produce galaxies with such high level of star formation and/or AGN activity. The nature of the interdependence between some key spectroscopic and morphological parameters in our objects (e.g., dominant energy source: super-starburst versus quasar, nuclear separation, merger phase, star formation rate, and infrared luminosity and color) is used to clarify the connection between starbursts, ultraluminous infrared galaxies, and quasars.

Paper presented at the conference on "QSO Hosts and their Environments", Granada, Spain, January 2001

E-mail contact: veilleux@astro.umd.edu,
preprint available at http://xxx.lanl.gov/abs/astro-ph/0104401

Searching for the Physical Drivers of the Eigenvector 1 Correlation Space

P. Marziani[1], J. W. Sulentic[2], T. Zwitter[3], D. Dultzin-Hacyan[4], and M. Calvani[1]

[1] Osservatorio Astronomico di Padova, vicolo dell'Osservatorio 5, I−35122 Padova, Italy
[2] Department of Physics and Astronomy, University of Alabama, Tuscaloosa, AL 35487, USA
[3] Department of Physics, University of Ljubljana, Jadranska 19, 1000, Ljubljana, Slovenia [4] Instituto de Astronomía, UNAM, Mexico, DF 04510, Mexico

We recently discussed an Eigenvector 1 (E1) parameter space that provides optimal discrimination between the principal classes of broad-line Active Galactic Nuclei (AGN). In this paper we begin a search for the most important physical parameters that are likely to govern correlations and data point distribution in E1 space. We focus on the principal optical parameter plane involving the width of the Hβ broad component [FWHM(H$\beta_{\rm BC}$)] and the equivalent width ratio between the Fe II blend at λ4570 and H$\beta_{\rm BC}$. We show that the observed correlation for radio-quiet sources can be accounted for if it is primarily driven by the ratio of AGN luminosity to black hole mass (L/M $\propto$ Eddington ratio) "convolved" with source orientation. L/M apparently drives the radio-quiet correlation only for FWHM(Hβ) $\lesssim$ 4000 km s^{-1} which includes Narrow Line Seyfert 1 (NLSy1) galaxies and can be said to define an AGN "main sequence." Source orientation plays an increasingly important role as FWHM(H$\beta_{\rm BC}$) increases. We also argue that AGN lying outside the radio-quiet "main sequence," and specifically those with optical Fe II much stronger than expected for a given FWHM(H$\beta_{\rm BC}$), may all be Broad Absorption Line QSOs.

Accepted by Astroph. J.

E-mail contact: marziani@pd.astro.it

Empirical diagnostics of the starburst-AGN connection

R. Cid Fernandes[1,2], T. Heckman[1], H. Schmitt[3,4], R. M. González Delgado[5] and T. Storchi-Bergmann[6]

[1] Department of Physics & Astronomy, Johns Hopkins University, 3400 N. Charles St., Baltimore, MD, 21218
[2] Depto. de Física - CFM, UFSC, Florianópolis, SC, Brazil
[3] Space Telescope Science Institute, 3700 San Martin Drive, Baltimore, MD, 21218
[4] National Radio Astronomy Observatory, PO Box 0, Socorro, NM 87801
[5] Instituto de Astrofísica de Andalucía (CSIC) , Apto. 3004, 18080 Granada, Spain
[6] Instituto de Física, Universidade Federal do Rio Grande do Sul, C.P 15001, 91501-970, Porto Alegre, RS, Brazil

We examine a representative sample of 35 Seyfert 2 nuclei. Previous work has shown that nearly half (15) of these nuclei show the direct (but difficult-to-detect) spectroscopic signature at optical/near-UV wavelengths of the hot massive stars that power circum-nuclear starbursts. In the present paper we examine a variety of more-easily-measured quantities for this sample, such as the equivalent widths of strong absorption features, continuum colors, emission-line equivalent widths, emission line ratios and profiles, far-IR luminosities, and near-UV surface brightness. We compare the composite starburst + Seyfert 2 nuclei to "pure" Seyfert 2 nuclei, Starburst galaxies and normal galactic nuclei. Our goals are to verify whether the easily-measured properties of the composite nuclei are consistent with the expected impact of a starburst, and to investigate alternative less-demanding methods to infer the presence of starbursts in Seyfert 2 nuclei, applicable to larger or more distant samples. We show that starbursts do indeed leave clear and easily quantifiable imprints on the near-UV to optical continuum and emission line properties of Seyfert 2's. Composite starburst + Seyfert 2 systems can be recognized by: (1) a strong "Featureless Continuum" (FC), which dilutes the CaII K line from old stars in the host's bulge to an equivalent width $W_K < 10$ Å; (2) emission lines whose equivalent widths are intermediate between Starburst galaxies and "pure" Seyfert 2's; (3) relatively low excitation line-ratios, which indicate that part of the gas ionization in these Seyfert 2's (typically $\sim 50\%$ of Hβ) is due to photoionization by OB stars; (4) large far IR luminosities ($> 10^{10}$ L$_\odot$); (5) High near-UV surface brightness ($\sim 10^3$ L$_\odot$ pc^{-2}). These characteristics are all consistent with the expected impact of circum-nuclear starbursts on the observed properties of Seyfert 2's. Furtheremore, they offer alternative empirical diagnostics of the presence of circum-nuclear starbursts from a few easily measured quantities.

Accepted by ApJ.

E-mail contact: cid@fsc.ufsc.br,
preprint available at http://xxx.lanl.gov/abs/astro-ph/0104186

A Very Radio-Loud Narrow-Line Seyfert 1: PKS 2004-447

Alicia Oshlack[1], Rachel Webster[1] and Matthew Whiting[1]

[1] School of Physics, University of Melbourne, Vic 3010, Australia

We have discovered a very radio-loud Narrow-Line Seyfert 1 candidate: PKS 2004-447. This Seyfert is consistent with the formal definition for NLS1s, although it does not have quite the same spectral features as some typical members of this subclass. Only ROSAT survey data is available at X-ray wavelengths, so it has not been possible to compare this source with other NLS1s at these wavelengths. A full comparison of this source with other members of the subclass will improve our physical understanding of NLS1s. In addition, using standard calculations, we estimate the central black hole to have a mass of $\sim 5 \times 10^6 M_\odot$. This does not agree with predictions in the literature, that radio-loud AGN host very massive black holes.

Accepted by ApJ

E-mail contact: aoshlack@physics.unimelb.edu.au,
preprint available at http://astro.ph.unimelb.edu.au/ aoshlack/nls1.ps

A catalogue of quasars and active nuclei (10th edition)

M.-P. Véron-Cetty[1] **and P. Véron**[1]

[1] Observatoire de Haute Provence, CNRS, F-04870 Saint-Michel l'Observatoire, France

The recent publication of the first release of the 2dF quasar catalogue (Croom et al. 2001) containing nearly 10 000 new QSOs, almost doubling the number of known such objects, led us to prepare an updated version of our catalogue of quasars and active nuclei which now contains 23 760 quasars, 608 BL Lac objects and 5 751 active galaxies (of which 2 765 are Seyfert 1s). Like the ninth edition, it includes position and redshift as well as photometry (U, B, V) and 6 and 11 cm flux densities when available.

Accepted by A&A

E-mail contact: mira@obs-hp.fr,
The catalogue is only available in electronic form at the Centre de Données Stellaires in Strasbourg(http://cdsweb.u-strasbg.fr) or at the Observatoire de Haute Provence (http://www.obs-hp.fr)

Formation of Obscuring Walls by Radiation Force from Circumnuclear Starbursts and Implications for Starburst-Active Galactic Nucleus Connection

Ken Ohsuga[1] **and Masayuki Umemura**[2]

[1] Yukawa Institute for Theoretical Physics, Kyoto University, Kyoto 606-8502, Japan
[2] Center for Computational Physics, University of Tsukuba, Tsukuba, Ibaraki 305-8577, Japan

We explore the formation of dusty gas walls induced by a circumnuclear starburst around an active galactic nucleus (AGN). We concentrate our attention on the role of the radiation force by a starburst as well as an AGN, where the effects of optical depth of dusty gas are taken into consideration. First, we solve the hydrostatic equations in spherical symmetry coupled with the frequency-dependent radiative processes, to demonstrate that a geometrically thin, optically thick wall forms due to the radiation pressure by a circumnuclear starburst. As a result, it is shown that the radiation force by the circumnuclear starburst works to stabilize optically thick walls surrounding the nucleus. In the case of a brighter starburst with a fainter AGN (e.g. $L_{\rm SB}/M_{\rm SB} \geq 10[L_\odot/M_\odot]$ and $L_{\rm AGN} \leq 10^{11} L_\odot$), there form double walls, an inner one of which is located between the nucleus and the circumnuclear starburst, and an outer one of which enshrouds both the starburst regions and the nucleus. As a consequence, double walls could heavily obscure the nucleus to make the AGN type 2. The outer wall may provide an explanation for the recent indications for large-scale obscuring materials in Seyfert 2's. Also, it is predicted that the AGN type is time-dependent according to the stellar evolution in the starburst, which shifts from type 2 to type 1 in several times 10^7 yr owing to the disappearance of walls. In contrast, if the AGN itself is much brighter than the starburst as a quasar is, ($L_{\rm AGN} \sim 10^{12} L_\odot$), then neither wall forms regardless of the starburst activity and the nucleus is likely to be identified as type 1. To conclude, the radiatively-supported gas walls could be responsible for the putative correlation between AGN type and the starbursts, whereby Seyfert 2 galaxies are more frequently associated with circumnuclear starbursts than type 1, whereas quasars are mostly observed as type 1 regardless of star-forming activity in the host galaxies.

Accepted by Astrophysical Journal

E-mail contact: ohsuga@yukawa.kyoto-u.ac.jp,
preprint available at http://xxx.lanl.gov/abs/astro-ph/0105474

Evidence for a Supermassive Black Hole in the S0 Galaxy NGC 3245

Aaron J. Barth[1]**, Marc Sarzi**[2,3]**, Hans-Walter Rix**[3]**, Luis C. Ho**[4]**, Alexei V. Filippenko**[5]**, and Wallace L. W. Sargent**[6]

[1] Harvard-Smithsonian Center for Astrophysics, 60 Garden Street, Cambridge, MA 02138
[2] Dipartimento di Astronomia, Università di Padova, Vicolo dell'Osservatorio 5, I-35122, Italy
[3] Max-Planck-Institut für Astronomie, Königstuhl 17, Heidelberg D-69117, Germany
[4] The Observatories of the Carnegie Institution of Washington, 813 Santa Barbara Street, Pasadena, CA 91101
[5] Department of Astronomy, University of California, Berkeley, CA 94720-3411
[6] Palomar Observatory, 105-24 Caltech, Pasadena, CA 91125

The S0 galaxy NGC 3245 contains a circumnuclear disk of ionized gas and dust with a radius of $1\farcs1$ (110 pc), making it an ideal target for dynamical studies with the Hubble Space Telescope (*HST*). We have obtained spectra of the nuclear disk with the Space Telescope Imaging Spectrograph, using an $0\farcs2$-wide slit at five parallel positions. Measurements of the Hα and [N II] emission lines are used to map out the kinematic structure of the disk in unprecedented detail. The data reveal a rotational velocity field with a steep velocity gradient across the innermost $0\farcs4$. We construct dynamical models for a thin gas disk in circular rotation, using *HST* optical images to map out the gravitational potential due to stars. Our modeling code includes the blurring due to the telescope point-spread function and the nonzero slit width, as well as the instrumental shift in measured wavelength for light entering the slit off-center, so as to simulate the data as closely as possible. The Hα+[N II] surface brightness measured from an *HST* narrow-band image is folded into the models, and we demonstrate that many of the apparent small-scale irregularities in the observed velocity curves are the result of the patchy distribution of emission-line surface brightness. Over most of the disk, the models are able to fit the observed radial velocity curves closely, although there are localized regions within the disk which appear to be kinematically disturbed relative to the overall rotational pattern. The velocity dispersion of [N II] λ6584 rises from $\sigma \approx 50$ km^{-1} in the outer disk to ~ 160 km^{-1} at the nucleus, and most of this linewidth cannot be attributed to rotational or instrumental broadening. To account for the possible dynamical effect of the intrinsic velocity dispersion in the gas, we also calculate models which include a correction for asymmetric drift. This correction increases the derived black hole mass by 10%, but leads to slightly poorer fits to the data. A central dark mass of $(2.1 \pm 0.5) \times 10^8$ $M_\odot$is required for the models to reproduce the steep central velocity gradient. This value for the central mass is consistent with recently discovered correlations between black-hole mass and bulge velocity dispersion.

Accepted by ApJ.

E-mail contact: abarth@cfa.harvard.edu,
preprint available at http://xxx.lanl.gov/abs/astro-ph/0012213

The Soft X-ray Properties of Nearby Low-Luminosity Active Galactic Nuclei and their Contribution to the Cosmic X-ray Background

Eve L. Halderson[1], Edward C. Moran[1], Alexei V. Filippenko[1], and Luis C. Ho[2]

[1] Department of Astronomy, University of California, Berkeley, CA 94720-3411.
[2] The Observatories of the Carnegie Institution of Washington, 813 Santa Barbara St., Pasadena, CA 91101

We have examined *ROSAT* soft X-ray observations of a complete, distance-limited sample of Seyfert and LINER galaxies. X-ray data are available for 46 out of 60 such objects which lie within a hemisphere of radius 18 Mpc. We have constructed radial profiles of the nuclear sources in order to characterize their spatial extent and, in some cases, to help constrain the amount of flux associated with a nuclear point source. PSPC data from *ROSAT* have been used to explore the spectral characteristics of the objects with sufficient numbers of detected counts. Based on the typical spectral parameters of these sources, we have estimated the luminosities of the weaker sources in the sample. We then explore the relationship between the soft X-ray and Hα luminosities of the observed objects; these quantities are correlated for higher-luminosity AGNs. We find a weak correlation at low luminosities as well, and have used this relationship to predict L_X for the 14 objects in our sample that lack X-ray data. Using the results of the spatial and spectral analyses, we have compared the X-ray properties of Seyferts and LINERs, finding no striking differences between the two classes of objects. However, both types of objects often exhibit significant amounts of extended emission, which could minimize the appearance of differences in their nuclear properties. The soft X-ray characteristics of the type 1 and type 2 active galaxies in the sample are also discussed. We then compute the local X-ray volume emissivity of low-luminosity Seyferts and LINERs and investigate their contribution to the cosmic X-ray background. The 0.5–2.0 keV volume emissivity of 2.2×10^{38} ergs s^{-1} Mpc^{-3} we obtain for our sample suggests that low-luminosity AGNs produce at least 9% of the soft X-ray background.

To appear in AJ.

E-mail contact: lho@ociw.edu,
preprint available at http://xxx.lanl.gov/abs/astro-ph/0105069

Central Structural Parameters of Early-Type Galaxies as Viewed with *HST*/NICMOS

Swara Ravindranath[1,2], Luis C. Ho[1], Chien Y. Peng[3], Alexei V. Filippenko[2], and Wallace L. W. Sargent[4]

[1] The Observatories of the Carnegie Institution of Washington, 813 Santa Barbara St., Pasadena, CA 91101
[2] Department of Astronomy, University of California, Berkeley, CA 94720-3411.
[3] Steward Observatory, Univ. of Arizona, Tucson, AZ 85721
[4]Palomar Observatory, 105-24 Caltech, Pasadena, CA 91125.

We present surface photometry for the central regions of a sample of 33 early-type (E, S0, and S0/a) galaxies observed at 1.6 μm (H band) using the *Hubble Space Telescope (HST)*. Dust absorption has less of an impact on the galaxy morphologies in the near-infrared than found in previous work based on observations at optical wavelengths. When present, dust seems to be most commonly associated with optical line emission. We employ a new technique of two-dimensional fitting to extract quantitative parameters for the bulge light distribution and nuclear point sources, taking into consideration the effects of the point-spread function. Parameterizing the bulge profile with a "Nuker" law (Lauer et al. 1995), we confirm that the central surface-brightness

distributions largely fall into two categories, each of which correlates with the global properties of the galaxies. "Core" galaxies tend to be luminous ellipticals with boxy or pure elliptical isophotes, whereas "power-law" galaxies are preferentially lower luminosity systems with disky isophotes. The infrared surface-brightness profiles are very similar to the optical, with notable exceptions being very dusty objects. Similar to the study of Faber et al. (1997) based on optical data, we find that galaxy cores obey a set of fundamental-plane relations wherein more luminous galaxies with higher central stellar velocity dispersions generally possess larger cores with lower surface brightnesses. Unlike most previous studies, however, we do not find a clear gap in the distribution of inner cusp slopes; several objects have inner cusp slopes ($0.3 < \gamma < 0.5$) which straddle the regimes conventionally defined for core and power-law type galaxies. The nature of these intermediate objects is unclear. We draw attention to two objects in the sample which appear to be promising cases of galaxies with isothermal cores that are not the brightest members of a cluster. Unresolved nuclear point sources are found in ~50% of the sample galaxies, roughly independent of profile type, with magnitudes in the range $m_H^{\rm nuc}$ = 12.8 to 17.4 mag, which correspond to $M_H^{\rm nuc}$ = −12.8 to −18.4 mag. Although the detection rate of compact nuclei seems favored toward galaxies spectroscopically classified as weak active galactic nuclei, we find no significant correlation between the near-infrared nuclear luminosities and either the optical emission-line luminosities or the inferred black-hole masses.

To appear in AJ.

E-mail contact: lho@ociw.edu,
preprint available at http://xxx.lanl.gov/abs/astro-ph/0105390

Inner Light Year of Seyfert Nucleus in NGC 4395

J. M. Wrobel[1], C. D. Fassnacht[2], and Luis C. Ho[3]

[1] National Radio Astronomy Observatory, P. O. Box 0, 1003 Lopezville Road, Socorro, NM 87801
[2] Space Telescope Science Institute, 3700 San Martin Drive, Baltimore, MD 21218
[3] The Observatories of the Carnegie Institution of Washington, 813 Santa Barbara St., Pasadena, CA 91101

The NRAO VLBA was used at 1.4 GHz to image the inner 550 mas (23 lt-years) of the nearest known Seyfert 1 nucleus, in the Sm galaxy NGC 4395. One continuum source was detected, with flux density 530 ± 130 μJy, diameter $d < 11$ mas (0.46 lt-year), and brightness temperature $T_b > 2.0 \times 10^6$ K. The spectral power P of the VLBA source is intermediate between those of Sagittarius A and Sagittarius A* in the Galactic Center. For the VLBA source in NGC 4395, the constraints on T_b, d, and P are consistent with an origin from a black hole but exclude an origin from a compact starburst or a supernova remnant like Cassiopeia A. Moreover, the spectral powers of NGC 4395 at 1.4 and 4.9 GHz appear to be too low and too constant to allow analogy with SN 1988Z, a suggested prototype for models of compact supernova remnants. The variable and warm X-ray absorber in NGC 4395 has a free-free optical depth much larger than unity at 1.4 GHz and, therefore, cannot fully cover the VLBA source.

Accepted by ApJ (Letters).

E-mail contact: jwrobel@nrao.edu,
preprint available at http://xxx.lanl.gov/abs/astro-ph/0104309

Circumnuclear stellar population, morphology and environment of Seyfert 2 galaxies: an evolutionary scenario

T. Storchi-Bergmann[1], R.M. González Delgado[2], H.R. Schmitt[3], R. Cid Fernandes[4] and T. Heckman[5]

[1] Instituto de Física, UFRGS, Campus do Vale, CP 15051, Porto Alegre, Brasil
[2] Instituto de Astrofísica de Andalucía (CSIC), Apdo. 3004, 18080, Granada, Spain
[3] National Radio Astronomy Observatories, P.O. Box 0, Socorro, NM87801
[4] Departamento de Física - CFM, UFSC, Florian'opolis, SC, Brasil
[5] Department of Physics & Astronomy, Johns Hopkins University, Baltimore, MD, 21218

We investigate the relation between the characteristics of the circumnuclear stellar population and both the galaxy morphology and the presence of close companions for a sample of 35 Seyfert 2 nuclei. Fifteen galaxies present unambiguous signatures of recent episodes of star formation within ≈300 pc from the nucleus. When we relate this property with the Hubble type of the host galaxy, we find that the incidence of recent circumnuclear star formation increases along the Hubble sequence, and seems to be larger than in non-Seyfert galaxies for the early Hubble types S0 and Sa, but similar to that in non-Seyfert galaxies for later Hubble types. Both in early-type and late-type Seyferts, the presence of recent star-formation is related to the galaxy morphology in the inner few kiloparsecs, as observed in HST images through the filter F606W by Malkan et al., who has assigned a late "inner Hubble type" to most Seyfert 2s with recent nuclear star-formation. This new classification is due to the presence

of dust lanes and spiral structures in the inner region. The presence of recent star formation in Seyfert 2 nuclei is also related to interactions: among the 13 galaxies of the sample with close companions or in mergers, 9 have recent star formation in the nucleus. These correlations between the presence of companions, inner morphology and the incidence of recent star formation suggest an evolutionary scenario in which the interaction is responsible for sending gas inwards which both feeds the AGN and triggers star-formation. The starburst then fades with time and the composite Seyfert 2 + Starburst nucleus evolves to a "pure" Seyfert 2 nucleus with an old stellar population. This scenario can reconcile the hypothesis that the active nucleus in Seyfert galaxies is triggered by interactions with the results of previous studies which find only a small excess of interacting galaxies in Seyfert samples when compared with non-Seyfert samples. The large excess can only be found early after the interaction, in the phase in which a composite (Seyfert + Starburst) nucleus is observed.

Accepted by Astrophys. J.

E-mail contact: thaisa@if.ufrgs.br,
preprint available at http://xxx.lanl.gov/abs/astro-ph/0105538.

A search for signatures of quasar evolution: Comparison of the shapes of the rest-frame optical/UV continua of quasars at $z > 3$ and $z \sim 0.1$

Olga Kuhn[1], Martin Elvis[2], Jill Bechtold[3], and Richard Elston[4]

[1] Joint Astronomy Centre, 660 N. A'ohoku Place, Hilo, HI 96720
[2] Harvard-Smithsonian Center for Astrophysics, 60 Garden St., Cambridge,MA 02138
[3] Steward Observatory, University of Arizona, Tucson, AZ 85721
[4] Department of Astronomy, University of Florida, Gainesville, FL 32611

For 15 bright (V<17.5), high redshift ($z > 3$) quasars, we have obtained IR spectra and photometry, and optical spectrophotometry and photometry, which we use to construct their rest-frame $1285 - 5100$ Å spectral energy distributions (SEDs). High resolution spectroscopy for 7 and L$'$ detections of 4 extend their SEDs shortwards of Lyα or redwards of 7500 Å. The average luminosities within a set of narrow, line-free, windows are computed. Power law fits to those from 1285 to 5100 Å, but excluding the $2000 - 4000$ Å region of the FeII+BaC 'small bump', adequately characterize the continuum shapes of most of the objects and yield optical/UV spectral indices (α_{ouv}: $F_\nu \sim \nu^{\alpha_{ouv}}$).

To look for signs of evolution, we compare the distribution of the α_{ouv} for the $z > 3$ quasars with that for a set of 27 $z \sim 0.1$ quasars which are matched to the high redshift ones in *evolved* luminosity. The mean (median) α_{ouv} for the high and low z samples are $-0.36(-0.41)$ and $-0.32(-0.30)$, respectively. Neither the distributions nor means differ significantly. The distributions of α_{ouv} for both samples span a wide range however, with $\Delta\alpha_{ouv} \sim 1$, which could be understood as the result of both a diversity in the emitted continua themselves and in the amounts of intrinsic extinction undergone.

A clear difference between the high and low z samples occurs in the region of the 'small bump'. The power law fit residuals for the low z sample show a systematic excess from $2200-3000$ Å; this feature is weak or absent in the high z sample. Further study is needed, but the 'small bump' evolution could reflect differences in iron abundance or FeII energy source, or alternatively, an intrinsic turnover in the continuum itself which is present at low but not at high z. (Abridged)

Accepted by Astroph. J. Suppl.

E-mail contact: o.kuhn@jach.hawaii.edu
preprint available at http://xxx.lanl.gov/abs/astro-ph/0105255

Jobs

Lecturer A/B in Observational Astronomy

Department of Physics & Astronomy,University of Leicester, UK

Available 1 October 2001 for 4 years
18,731 to 30,967 pa
Ref:A5427/JAU

A Lecturer Grade A post is available in the Department of Physics & Astronomy.The post is available for four years, from 1 October 2001 to 30 September 2005. The Lecturer will be required both to contribute to the Departments programme of undergraduate teaching, including development and delivery of lecture courses, tutorials and projects, and also to develop a programme of independent and collaborative research within the X-ray and Observational Astronomy Group. The Groups research interests are broad, ranging from cool/hot stars, and binary systems to normal and active galaxies, galaxy clusters, and the cosmic X-ray background. Although much of our research activity is in the area of high-energy astrophysics, we are also users of most major ground-based and other satellite facilities. Candidates will hold a PhD in a relevant discipline, be able to demonstrate their ability to successfully undertake the teaching duties required, and have a proven record of excellence in research.

Initial salary will be within the Grade A scale, or the first two points of the Grade B scale.

Informal enquiries may be made to Professor Martin Ward (tel: 0116-252-3540; e-mail: mjw@star.le.ac.uk).

Application forms and further particulars are available from the Personnel Office, University of Leicester, University Road, Leicester LE1 7RH, tel 0116 252 5114, fax 0116 252 5140, email personnel@le.ac.uk, or via the web on www.le.ac.uk/personnel/jobs. Closing date:22 June 2001.

The Active Galaxies Newsletter is available on the World Wide Web. You can access it via the University of Manchester home page :- http://www.ast.man.ac.uk/~rb/agn/
If you change your e-mail address changes, please send the editor your new address. If the Newsletter repeatedly bounces back from an address then that address is deleted from the mailing list.