Active Galaxies Newsletter	*An electronic publication dedicated to the observation and theory of active galaxies*
No. 33 — December 1999	Editor: Matt Redman (mpr@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.
Matt Redman

Abstracts of recently accepted papers

Characteristics of the variability of the nucleus of NGC 1275 in the optical in 1982 – 1994.

I.I. Pronik, N.I. Merkulova, L.P. Metik

[1] Crimean Astrophysical Observatory, Crimea, Ukraine and Isaac Newton Institute of Chile, Crimean Branch

We study the variability of the nucleus of NGC 1275 in the optical region using two samples of the photoelectric observations obtained with the 1.25-m telescope of the Crimean Astrophysical Observatory. The first sample contains one series of 379 measurements of the nucleus brightness obtained with the scanning spectrophotometer during 35 nights from 12.XI.1982 to 23.X.1987. The slit $\Delta\lambda = 80$Å was centered at the wavelength λ 5200Å. The second sample contains 5 series of 820 measurements obtained simultaneously in each of the UBVRI bands during 37 nights from 22.XII.1989 to 29.XII.1994. The observations during one night lasted from 0.5 up to 8.7 hours. Each of the 6 independent observational series was analyzed separately.

An analysis has been made of the variations both on a time scale of years and of single nights (intra–night). Ratios of Standard Deviations (SD) of the variable flux to the error of the observations (σ) were calculated for each night, and the parameters of Structure Functions (SF) were used as indications of the intranight variability. We assume that the intranight variations of the flux are real, when SD $\geq 3\sigma$. There were 8% of such nights in 1982 – 1987, and about 40% of nights showed intranight variability in 1989–1994.

SFs of the intranight variations for all series of observations are characterized by the two slopes log(SF) $\sim$ b log dt: for time scales less than 4 hours the slope is in the range 0.25$\leq$b$\leq$0.66, for the time scales less than 9 hours it is in the range 0.66$\leq$b$\leq$1.19. These data allow us to conclude that during 1982–1994 two processes operated in the nucleus of the NGC 1275 galaxy, causing variations of its flux in the optical on a time scale of several hours. One of the processes was a mixture of shot–noise and flicker–noise, and the second one was nearer to pure shot–noise.

The SF slopes for the time scale years were in the range of 0.06–0.14. They evidenced that on the time scale years the process was absent, or a pure flicker–noise is operated. The evolution of the processes acting in the nucleus from 1968 –1980 to 1982 – 1994 is mentioned. A years process is evolved in accordance with the general flux variations, but an activity of the intranight variations is increased with the decreasing of the general brightness of the nucleus. All obtained data are discussed from the point of view of the current models of a powering mechanism.

Accepted by Astron.& Astrophys.

E-mail contact: ipronik@crao.crimea.ua

X-ray emission/absorption mechanisms of 4 NLSy-1-like AGN and a radio quasar: QSO 0117-2837, RX J0134.3-4258, NGC 4051, Mrk 1298, and 4C +74.26

Stefanie Komossa[1] **and Janek Meerschweinchen**[2]

[1] Max-Planck-Institut für extraterrestrische Physik, Giessenbachstrasse, 85748 Garching, Germany
[2] Obernkirchen

We present a study of the X-ray variability properties and spectral shapes of five active galaxies all of which show extreme or enigmatic X-ray properties. We focus on QSO 0117-2837, RX J0134-4258, and NGC 4051, and briefly comment on Mrk 1298 and 4C +74.26. The individual objects were originally partly selected as candidates to host warm absorbers on the basis of (i) characteristic X-ray absorption features (NGC 4051, Mrk 1298, 4C +74.26), (ii) extreme X-ray spectral steepness (QSO 0117-2837; this object is found to be located in the 'zone of avoidance' when plotted in the Γ_x–FWHM$_{H\beta}$ diagram), and (iii) drastic spectral variability (RX J0134-4258). The temporal analysis reveals large-amplitude variability by a factor ~30 in the long-term X-ray lightcurve of NGC 4051, very rapid variability of Mrk 1298, constant X-ray flux of the NLSy1 galaxy QSO 0117-2837, and constant mean countrate of RX J0134-4258 despite huge spectral changes. Besides the warm absorber, several further mechanisms and their merits/shortcomings are investigated to explain the spectral characteristics of the individual objects. Different models are favored for different sources. Consequences for Narrow-line Seyfert 1s in general are discussed and we present results from photoionization models to distinguish between different suggested NLSy1 scenarios.

A&A, in press

E-mail contact: skomossa@xray.mpe.mpg.de;
Preprint and related papers are available at http://www.xray.mpe.mpg.de/~skomossa/

Observations of the host galaxies of the BL Lacertae objects H 0414+009 and OJ 287 with FORS1 at VLT–UT1

J. Heidt[1], **K. Nilsson**[2], **I. Appenzeller**[1], **K. Jäger**[3], **W. Seifert**[1], **T. Szeifert**[1,4], **W. Gässler**[5], **R. Häfner**[5], **W. Hummel**[5], **B. Muschielok**[5], **H. Nicklas**[3] **and O. Stahl**[1]

[1] Landessternwarte Heidelberg, Königstuhl, D–69117 Heidelberg, Germany
[2] Tuorla Observatory, FIN–21500 Piikkiö, Finland
[3] Universitäts-Sternwarte Göttingen, Geismarlandstraße 11, D–37083 Göttingen, Germany
[4] ESO Santiago, Alonso de Cordova 3107, Santiago 19, Chile
[5] Universitäts-Sternwarte München, Scheinerstr. 1, D–81679 München, Germany

We present imaging of the host galaxies of H 0414+009 and OJ 287 taken during the commissioning phases of FORS1 at the VLT–UT1. The host galaxy of H 0414+009 is well resolved in R and I, and marginally resolved in B. Based on our 2–dimensional modelling, it is a large and very luminous elliptical galaxy ($M_R = -24.6$, $r_e = 35$ kpc) with colours commonly found in elliptical galaxies (B–R ~ 1.45 and R–I ~ 0.45). The results are consistent with previous findings.

The host galaxy of OJ 287 is marginally resolved. A de Vaucouleurs profile is slightly preferred over a disk-type profile. If true, the host galaxy is luminous ($M_R = -23.4$), compact ($r_e = 4.4$ kpc) and has a small offset to the south with respect to the active nucleus. This is consistent with the results obtained by Sillanpää et al. (1999), but different to the findings by Wurtz et al. (1996) and Yanny et al. (1997).

The analysis of the marginally resolved host galaxies was complicated by a point spread function (PSF) varying across the field. Consequently, better results were obtained when using a PSF which varies with field position as compared to a constant PSF. This is possible as long as a sufficient number of stars is present on the images. Masking the central regions mostly affected by the PSF errors may also improve the results. Based on our experience we describe precaution which has to be taken for FORS1 observations and subsequent analysis of marginally resolved targets such as AGN host galaxies or planetary nebulae around young stellar objects.

Accepted by A&A Letters, special VLT edition, Dec. 15th 1999

E-mail contact: jheidt@lsw.uni-heidelberg.de

Reverberation Measurements for 17 Quasars and the Size–Mass–Luminosity Relations in Active Galactic Nuclei

Shai Kaspi[1,2], Paul S. Smith[3] Hagai Netzer[1], Dan Maoz[1], Buell T. Jannuzi[3], and Uriel Giveon[1]

[1] School of Physics and Astronomy and the Wise Observatory, The Raymond and Beverly Sackler Faculty of Exact Sciences, Tel-Aviv University, Tel-Aviv 69978, Israel
[2] Current address: Department of Astronomy & Astrophysics, The Pennsylvania State University, University Park, PA 16802
[3] National Optical Astronomy Observatories, P.O. Box 26732, Tucson, AZ 85719

Correlated variations in the line and continuum emission from active galactic nuclei (AGN) can be used to determine the size and geometry of the broad emission line regions (BLRs). We have spectrophotometrically monitored a well-defined sample of 28 Palomar-Green quasars in order to obtain measurements of their BLRs and to investigate the relationships between quasar luminosity, central black hole mass, and BLR size in AGN. Spectrophotometry was obtained every 1–4 months for 7.5 years, yielding 20–70 observing epochs per object. Both the continuum and emission line fluxes of all of the quasars were observed to change during the duration of the observing program. Seventeen of the 28 objects were observed with adequate sampling ($\gtrsim$ 20 independent observing epochs) to search for correlated variations between the Balmer emission lines and the continuum flux. For each of these 17 objects, a significant correlation was observed, with the Balmer line variations lagging those of the continuum by ~100 days (rest frame). Our work increases the available luminosity range for studying the size–mass–luminosity relations in AGN by two orders of magnitude and doubles the number of objects suitable for such studies. Combining our results with comparable published data available for Seyfert 1 galaxies, we find the BLR size scales with the rest-frame 5100 Å luminosity as $L^{0.70\pm0.03}$. This determination of the scaling of the size of the BLR as a function of luminosity is significantly different from those previously published, and suggests that the effective ionization parameter in AGN may be a decreasing function of luminosity. We are also able to constrain, subject to our assumption that gravity dominates the motions of the BLR gas, the scaling relationship between the mass of the central black holes and the luminosity in AGN. We find that the central mass scales with 5100 Å luminosity as $M \propto L^{0.5\pm0.1}$. This is inconsistent with all AGN having optical luminosity that is a constant fraction of the Eddington luminosity.

Accepted by the Astrophysical Journal

E-mail contact: shai@astro.psu.edu,
preprint available at http://xxx.lanl.gov/abs/astro-ph/9911476

A link between the H_β equivalent width, profile width, BLR size, and optical luminosity from a small sample of well-studied active galactic nuclei

S.G. Sergeev[1,2], V.I. Pronik[1,2], E.A. Sergeeva[1,2], and Yu.F. Malkov[1]

[1] Crimean Astrophysical Observatory, Nauchny, 334413 Crimea, Ukraine
[2] Isaac Newton Institute of Chile, Crimean Branch

We present diagrams of the relationship between the broad H_β emission-line parameters and the continuum luminosity obtained from a sample of 31 well-studied Seyfert 1.0–1.5 galaxies and quasars.

The equivalent width of the H_β line is inversely correlated with the continuum luminosity at λ5100Å as $EW \sim L_{5100}^{-0.047\pm0.038}$, which seems to be comparable to that obtained by other authors for the Ly_α. So, we have detected, although very marginally, a Baldwin effect in the H_β line. The remarkably small scattering of the H_β equivalent widths probably indicates approximately the same spectral energy distribution from optics to ionizing radiation, nearly the same covering factor, and nearly isotropic continuum emission, although some of these agents can show small systematic changes with luminosity.

The intrinsic Baldwin effect for the H_β is clearly seen only in NGC 5548. Considering the observed lag–luminosity and lag–linewidth dependences we suppose that it might be caused by full ionization of clouds.

We compute the linear regression parameters (the slopes and intercepts) of the relationship between the H_β and optical continuum fluxes. In some cases, the regression parameters derived from the homogenious data sets are significantly different for different observational periods.

The lag of the H_β response to continuum variations shows a strong correlation with the luminosity. Combining the regression results on time delay and rms widths of the H_β line we obtained the following mass–luminosity relationship for AGNs: $L \propto M^{1.9\pm1.1}$.

Accepted by Astron. J., Scheduled issue: December 1999, vol. 118

E-mail contact: sergeev@crao.crimea.ua

The Narrow-Line Regions of LINERs as Resolved with the *Hubble Space Telescope*

Richard W. Pogge[1], Dan Maoz[2], Luis C. Ho[3], and Michael Eracleous[4]

[1] Deparment of Astronomy, The Ohio State University
[2] School of Physics & Astronomy and Wise Observatory, Tel-Aviv University
[3] Carnegie Observatories [4] Department of Astronomy and Astrophysics, The Pennsylvania State University

Low-ionization nuclear emission-line regions (LINERs) exist in the nuclei of a large fraction of luminous galaxies, but their connection with the active galactic nucleus (AGN) phenomenon has remained elusive. We present *Hubble Space Telescope* (*HST*) narrowband ([O III]λ5007 and Hα+[N II]) emission-line images of the central regions of 14 galaxies with LINER nuclei. This is the first such study of a sizable sample of LINERs at *HST* resolution. The compact, $\sim 1''$-scale, unresolved emission which dominates the line flux in ground-based observations of these LINERs is mostly resolved in the *HST* images. The bulk of the Hα and [O III] emission comes from regions with sizes of tens to hundreds of parsecs. The resolved emission comes from a combination of knots, filaments, and diffuse gas whose morphology differs from galaxy to galaxy. Most of the galaxies do not show clear linear structures or ionization cones analogous to those often seen in Seyfert galaxies. An exception is NGC 1052, the prototypical LINER, in which we find a $3''$-long (~ 250 pc) biconical structure that is oriented on the sky along the galaxy's radio jet axis. M84 also shows signs of possible biconical gas structures. Seven of the galaxies have been shown in previously published *HST* images to have a bright compact ultraviolet (UV) nuclear source, while the other seven do not display such a central UV source. Our images show a dusty environment in the nuclear region of all 14 galaxies, with clear indications of obscuration of the nuclei in most of the "UV-dark" cases. The data thus suggest that the line-emitting gas in most LINERs is photoionized by a central source (which may be stellar, nonstellar, or a combination thereof) but that this source is often hidden from direct view in the UV by dust in the host galaxy. We find no obvious differences between the morphologies of the nine "LINER 1.9s" with detected weak broad Hα wings in their spectra and the morphologies of the other five objects. Likewise, there is no clear distinction in morphology between objects whose UV spectra are dominated by hot stars (e.g., NGC 4569) and those that are more AGN-like (e.g., NGC 4579).

Accepted by the ApJ (2000 Apr 1 issue)

E-mail contact: pogge@astronomy.ohio-state.edu,
preprint available at http://xxx.lanl.gov, astro-ph/9910375

Radio Observations of the Hubble Deep Field South - a New Class of Radio-Luminous Galaxies?

R.P. Norris[1], A. Hopkins[1], R.J.Sault[1], R.D.Ekers[1], J.Ekers[1], F.Badia[1], J.Higdon[1], M.H.Wieringa[1], B.J.Boyle[2], and R.E.Williams[3]

[1] CSIRO Australia Telescope National Facility, P. O. Box 76, Epping, NSW 1710, Australia
[2] Anglo-Australian Observatory,P.O. Box 296, Epping, NSW 1710, Australia
[3] Space Telescope Science Institute,3700, San Martin Drive, Johns Hopkins University Homewood Campus, Baltimore, MD 21218 USA

We present the first results from a series of radio observations of the Hubble Deep Field South and its flanking fields. Here we consider only those sources greater than 100 microJy at 20 cm, in an 8-arcmin square field that covers the WFPC field, the STIS and NICMOS field, and most of the HST flanking fields and complementary ground-based observations. We have detected 13 such radio sources, two of which are in the WFPC2 field itself. One of the sources in the WFPC field (source c) corresponds to a very faint galaxy, and several others outside the WFPC field can not be identified with sources in the other optical/IR bands. The radio and optical luminosities of these galaxies are inconsistent with either conventional starburst galaxies or with radio-loud galaxies. Instead, it appears that it belongs to a population of galaxies which are rare in the local Universe, possibly consisting of a radio-luminous active nucleus embedded in a very dusty starburst galaxy, and which are characterised by a very high radio/optical luminosity ratio.

in "Perspectives in Radio Astronomy: Imperatives at cm and m Wavelengths" (Dwingeloo: NFRA), Edited by: M.P. van Haarlem & J.M. van der Hulst

X-ray and ultraviolet spectral properties of the X-ray transient quasar PG0844+349

T.G. Wang[1,2], W. Brinkmann[3], M. Matsuoka[1], J.X. Wang[2] and W. Yuan[3]

[1] The Institute of Physical and Chemical Research (*RIKEN*), 2-1, Hirosawa, Wako, Saitama, 351-0198, Japan
[2] Center for Astrophysics, University of Science and Technology of China, Anhui, 230026, China
[3] Max-Planck-Institut für extraterrestrische Physik, Giessenbachstrasse,D-85740 Garching, FRG

Despite the fact that quasars are generally strong X-ray emitters, ROSAT discovered several objects with only very weak X-ray emission. In this paper, the X-ray data from ASCA and ROSAT, and the UV spectra from HST and IUE of one of these quasars, PG0844+349, are analyzed. The ROSAT spectrum can be well fitted by a single power law with Galactic absorption.

No spectral variations were observed during changes of the (0.1-2.4) keV X-ray flux by a factor of ten between the ROSAT All-Sky Survey and pointed observations, separated by 6 months. The ASCA satellite found the object in a high state with a photon index of 1.98 and an Fe Kα line with EW$\sim$300 eV.

The X-ray flux in the 2-10 keV band is highly variable; the fastest variation detected is 60% in less than 2 10^4 sec. The measured excess variance fits well the excess variance versus $L_{2-10keV}$ relation for Seyfert 1 galaxies; the flux variability in the (0.5-2.0) keV band shows a slightly higher amplitude than in the (2-10) keV band. We show that the optical micro-variability of this object can actually be driven by re-processing of the variable X-ray flux if half of the absorbed X-rays are re-radiated in the optical - UV band.

A weak broad intrinsic absorption line (FWHM$\simeq$ 800 km/s), most likely Lyα absorption blue-shifted by a velocity $\simeq$ -6000 km s^{-1} relative to the quasar's rest frame, is found in the HST FOS spectrum. A similar CIV broad absorption line may also be present in the low resolution IUE spectrum.

Historic light curves in the X-ray, UV, and optical bands indicate that the variability amplitude in the UV and optical band is much smaller than at X-rays. The QSO can be classified as X-ray weak only on one occasion out of five X-ray observations. An analysis of the long term behavior of several other X-ray weak objects shows no indications for a similar large X-ray variability.

Accepted by Astrophy. J.

E-mail contact: twang@ustc.edu.cn

X-ray plasma diagnostics for totally and partially photoionized plasmas such as Warm Absorber in AGN

Delphine Porquet[1] **and Jacques Dubau**[2]

[1] Observatoire de Paris, section de Meudon (DAEC), France
[2] Observatoire de Paris, section de Meudon (DARC), France

Thanks to the new generation of X-ray satellites such as Chandra and XMM, high resolution and high sensitivity spectra are available. In particular, for the first time, the three most intense lines (resonance, intercombination and forbidden) of low charged (low Z) He-like ions are splitted for non solar plasmas.
We present density, ionizing process and temperature diagnostics, for totally and partially photoionized plasmas, based on ratios of these three lines. These powerful plasma diagnostics could be used for hot astrophysical plasmas such as AGN, starburst galaxies, X-ray binaries, etc. In particular, they could be applied to Warm Absorber often seen in Active Galactic Nuclei (Porquet & Dubau 2000), which is an important key tool to understand central region of different types of AGN (Seyfert 1 and 2, high and low redshift quasars).

To appear in Revista Mexicana de Astronomia y Astrofisca, Conference Series, (Eds) J. Franco, J. Arthur & N. Brickhouse.

E-mail contact: delphine.porquet@obspm.fr,
preprint available at: astro-ph/9912065

The Molecular Gas in the Circumnuclear Region of Seyfert Galaxies

E. Schinnerer[1], **A. Eckart**[1] **and L.J. Tacconi**[1]

[1] Max-Planck-Institut für extraterrestrische Physik, 85740 Garching, Germany

Sub-arcsecond IRAM Plateau de Bure mm-interferometric observations of the ^{12}CO (2-1) line emission in the Seyfert 1 NGC 3227 and the Seyfert 2 NGC 1068 have revealed complex kinematic systems in the inner 100 pc to 300 pc that are not consistent with pure circular motion in the host galaxies. Modeling of these kinematic systems with elliptical orbits in the plane of the host galaxy (representing gas motion in a bar potential) is a possible solution but does not reproduce all features observed. A better description of the complex kinematics is achieved by circular orbits which are tilted out of the plane of the host galaxy. This could indicate that the thin circumnuclear gas disk is warped. In the case of NGC 1068 the warp model suggests that at a radius of $\sim$ 70 pc, the gas disk is oriented edge-on providing material for the obscuration of the AGN nucleus. The position-velocity diagrams show rising rotation curves at $r \leq 13$ pc and an indication for large enclosed masses of $\geq 2\times10^7 M_\odot$ for NGC 3227 and $\geq 10^8 M_\odot$ for NGC 1068 within the central 25 pc.

Ap.J. Letters, 524, L5

E-mail contact: es@astro.caltech.edu,

preprint available at astro-ph/9907382

Distribution and Kinematics of the Circum-nuclear Molecular Gas in the Seyfert 1 Galaxy NGC 3227

E. Schinnerer[1], **A. Eckart**[1] **and L.J. Tacconi**[1]

[1] Max-Planck-Institut für extraterrestrische Physik, 85740 Garching, Germany

We present new interferometric observations of the ^{12}CO (1-0) , ^{12}CO (2-1) , and HCN (1-0) molecular line emission in NGC 3227 obtained with the IRAM Plateau de Bure interferometer (PdBI). We achieved an unprecedented angular resolution in the ^{12}CO (2-1) line of about 0.6" corresponding to only about 80 pc at a distance of 17.3 Mpc. The mapped ^{12}CO emission is concentrated in the inner 8" and accounts for 20% of the total 30 m ^{12}CO line flux. The ^{12}CO emission is resolved into an asymmetric nuclear ring with a diameter of about 3". The HCN line emission is mostly unresolved at our resolution of $\sim$ 2.4" and contains all of the single dish flux. We have decomposed the observed molecular gas motions into a circular and non-circular component revealing that about 80 % of the gas in the circum-nuclear region exhibits pure circular rotation. We find evidence for bar streaming onto the nuclear ring and a redshifted emission knot on the ring perimeter.
In the central arcsecond the gas shows apparent counter rotation. This behavior can be best explained by a warping of the inner molecular gas disk rather than gas motion in a nuclear bar potential. We detected molecular gas at a distance from the nucleus of only $\sim$13 pc with a velocity of about 75 km/s with respect to the systemic velocity and find that within the central arcsecond the rotation curve is rising again. This is the first time that millimetric CO-line emission has been detected interferometrically at such small distances to the nucleus of a Seyfert galaxy. These measurements indicate a lower limit on the enclosed mass of about 2×10^7 $M_\odot$ in the inner 25 pc.

Ap. J. April 2000, in press

E-mail contact: es@astro.caltech.edu,
preprint available at astro-ph/9911487

Bars and Warps traced by the Molecular Gas in the Seyfert 2 Galaxy NGC 1068

E. Schinnerer[1], **A. Eckart**[1], **L.J. Tacconi**[1], **R. Genzel**[1] **and D. Downes**[2]

[1] Max-Planck-Institut für extraterrestrische Physik, 85740 Garching, Germany
[2] Institut de Radio Astronomie Millimétrique, 38406 Saint Martin d'Hères, France

We present new interferometer observations of the ^{12}CO (1-0) and ^{12}CO (2-1) line emission of NGC 1068 with a resolution of $0.7''$. The molecular gas in the inner $5''$ is resolved into a ring with two bright knots east and west of the nuclear continuum emission. For the first time in NGC 1068, we can trace molecular gas at $\approx 0.18''$ (13 pc) from the nucleus. The high velocities in this region imply an enclosed mass of $\sim$$10^8$ $M_\odot$. This value is consistent with a black hole mass of 1.7×10^7 $M_\odot$, as estimated from nuclear H_2O maser emission, plus a contribution from a compact nuclear stellar cluster. Perpendicular to the kinematic major axis optical images of NGC 1068 show a bright, stellar, oval structure of eccentricity 0.8 and a deprojected length of 17 kpc. Analysis of the rotation curve shows the CO spiral arms are at the inner Lindblad resonance of this bar-like structure. Inside the molecular spiral arms, $10''$ from the nucleus, the CO kinematic axis changes direction probably in response to the to the 2.5 kpc (deprojected) long stellar bar seen in the near infrared (NIR). The low velocity dispersion indicates the molecular gas is in a disk with a thickness of 10 pc in the nuclear region and 100 pc in the spiral arms.
We constructed kinematic models for the molecular gas using elliptical orbits caused by a $\sim 1''$ (72 pc) nuclear bar and using tilted rings resulting in a warp. We find that the gas motions are consistent with either the warp or the bar models. However, because there is no evidence for a $\sim 1''$ nuclear bar in NIR images, we favor the warp model. A warped CO disk can also explain the obscuration of the AGN, the extinction of light from the nuclear stellar cluster, and the observed NIR and mid-IR polarization. The model predicts the warped CO disk should become edge-on at a radius of 70 pc, thereby creating a cavity for the ionization cone.

Ap.J. April 2000, in press

E-mail contact: es@astro.caltech.edu,
preprint available at astro-ph/9911488

Dissertation abstract

Line Emission from Stellar Winds in Active Galactic Nuclei

Jason A. Taylor

Thesis work conducted at: NASA Goddard Space Flight Center, Greenbelt, Maryland, USA

Electronic mail: jataylor@nadn.navy.mil

Ph.D dissertation directed by: Demosthenes Kazanas

Ph.D degree awarded: May 1999

This dissertation presents synthetic spectra and response functions of the red giant stellar line emission model of active galactic nuclei. Our results agree with the fundamental line emission characteristics of active galactic nuclei within the model uncertainties if the following new assumptions are made: 1) the mean stellar mass loss rates decrease with distance from the black hole, and 2) the mean ionization parameters are lower than those postulated in Kazanas (1989). For models with enhanced mass loss, the zero-intensity-full-widths of the line profiles are proportional to the black hole mass to the power of 1/3. This scaling relation suggests that the black hole masses of NLS1s (narrow-line Seyfert 1s) are relatively low. Models with enhanced mass loss also predict minimum line/continuum delays that are proportional to the zero-intensity-full-widths of the profiles. Because of their high column densities, these models yield triangle-shaped response functions, which are not generally observed. On the other hand, models without enhanced mass loss yield line-continuum delays that are proportional to the square root of the continuum luminosity. This prediction appears to agree with results from reverberation mapping campaigns.

If the intercloud (interstellar) medium densities are high enough, the winds are "comet shaped," with the shock fronts having higher densities than the cloud "tails." In this case, the densities in the ionized (inverse Strömgren regions) of the outbound clouds are lower than those of the inbound clouds. For models in which an accretion disk occults the broad line region, the broadest line emission and absorption profile components of lines similar to C IV, N V, and O VI are redshifted. Conversely, the narrowest emission and absorption profile components are blueshifted. The shifts of the Lyman alpha profile components are much smaller. One particularly interesting prediction of the nonspherical wind models is that their C IV red wings respond faster than their blue wings, as has been observed (e.g., Done & Krolik 1996). These same models, however, yield opposite results for the C III] line, such that the C III] *blue* wings respond first. For this reason, measurements of the velocity dependence of the C III] profile response could be used to test the viability of nonspherical stellar wind line emission models.

Preprint available at http://arXiv.org/abs/astro-ph/9912036.

Meetings

9th Meeting of the European Astronomical Society

Moscow, Russia
May 29 to June 3 2000

The 9th Meeting of the European Astronomical Society (EAS) will be held in Moscow, Russia, jointly with the 5th Conference of the Euro-Asian Astronomical Society (EAAS) from May 29 to June 3 2000.

The Conference will cover the basic fields of astronomy and astrophysics and is open to all astronomers. More detailed information on this conference is at the JENAM-2000 web-page:

http://www.sai.msu.su/jenam/

http://www.inasan.rssi.ru/INASAN/JENAM/

http://www.iap.fr/eas/meetings.html

During this conference is organized a special session on:

"The central engine of AGN: structure, feeding, and evolution"

There will be a total of 2 working days, divided among 4 or 5 sessions on different days in the frame of the conference working period. About 2/3 of the time will devoted to general review and invited talks, and the rest to 2 parallel workshops on monitoring and on jets. Contributed talks and posters will be welcome. The registration form can be found on the Web page of the JENAM. Propositions for oral or written communications should be sent either to **beskin@lpi.ru** or to **vilk@afi.academ.alma-ata.su**. A more detailed program will be found in the next issue of the AGN Newsletter.

Scientific Organizing Commity:

Vassily Beskin (co-chair), Nicolai Bochkarev, Suzy Collin (co-chair), Edward Khachikian, Boris Komberg, Jumber Lominadze, Martin Rees, Emmanuil Vilkoviskij (co-chair), Lo Woltjer

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/~mpr/agn/