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.

IMPORTANT CHANGES TO THE NEWSLETTER

Please note that the web & email addresses for the Active Galaxies Newsletter has changed. This is part of a rationalisation of servers at the newsletter's host institute. This will be announced in due course. In the immediate future the old web & email address will for forward to the new addresses but please make note of the new address and change your bookmarks.

THE NEW EMAIL ADDRESS IS: agnews@manchester.ac.uk

THE WEB-PAGE ADDRESS IS: http://www.manchester.ac.uk/jodrellbank/∼agnews

A NEW SECTION FOR THE NEWSLETTER:
Submitted papers for discussion

It has recently been suggested to me by one of the contributers and subscribers to the newsletter that a the inclusion of recently submitted, but not refereed papers, in the newsletter would be a useful addition. This section would allow authors to disseminate there new and exciting work earlier to the community and allow open discussion and feedback to the authors at an early stage. As such from the next issue the newsletter will be publishing abstracts, with associated web-links where the full paper can be downloaded, of submitted but not accepted papers. This will be an additional and separate section in the newsletter and clearly labelled. In addition to the abstract authors will be able to optionally include a short paragraph with additional comments regarding the work. In addition to appearing in the newsletter these contributions will also be posted on the Newsletter's web-pages promptly following their receipt.

It is hoped that this new section will be popular and useful to the subscribers and readers by allowing very prompt dissemination and hence discussion of new results amongst a targeted group of researchers. A LaTeX macro template for these new contributions will be available shortly from the webpages.

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.

Rob Beswick

Abstracts of recently accepted papers

The broad band spectrum and variability of NGC 4151 observed by BeppoSAX

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We present an analysis of all *BeppoSAX* observations of NGC 4151. This source was observed 5 times from 1996 to 2001 with durations ranging from a day to four days. The intrinsic continuum (described as a cut-off power law) is absorbed at low energies by a complex system: a cold patchy absorber plus a warm uniform screen photoionised by the central continuum. We find that this "dual absorber" is the main driver of the observed variability, up to a factor of eight, at 3 keV. In particular the covering fraction of the cold absorber changes on time scales of the order of a day, supporting its association with the broad-line region. The column density of the warm gas varies on a longer time scale (months to year). Some of the small amplitude spectral variability above 10 keV can be explained with an intrinsic variation (with variation of the photon index $\Delta\Gamma \sim 0.2$). The flux below 1 keV remains constant confirming an extended origin. Its spectrum is reproduced by a combination of a thermal component (with temperature $kT = 0.15$ keV) and a power law with the same slope as the intrinsic continuum, but with an intensity of a few percent. A Compton reflection component is significantly detected in 1996 (averaged value of $\Omega/2\pi \sim 0.4$, with the solid angle Ω covered by the reflecting medium), with intensity decreasing on a time scale of a year, and it desappears in 2000 and 2001. The long time scale of variations argues for an association with an optically thick torus at a distance of a few light years. An iron line was detected in all spectra. Its energy is consistent with fluorescence by cold iron. We find that the line is variable. Its behaviour is reproduced by a variable component proportional to the level of the reflection flux plus a constant component. The flux of the latter is consistent with the extended line emission observed by *Chandra*. We conclude that the first component likely arises from the torus and the second is produced in the extended narrow-line region.

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3D Radiative Transfer Modeling of Clumpy Dust Tori Around AGN

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We present 3-dimensional radiative transfer models for clumpy dust tori around AGN (see Hönig et al. 2006, A&A, 452, 459). Our method combines Monte Carlo simulations of individual dust clouds with the actual 3-dimensional distribution of clouds in the torus. The model has been applied to NIR and MIR photometric and interferometric observations of NGC 1068. For the first time, it is possible to simultaneously reproduce both photometric and interferometric observations in the NIR and MIR. We infer a luminosity $L = 2 \times 10^{45}$ erg/s and an inclination of $i = 70$ deg for NGC 1068 from our model.

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Modeling optical and UV polarization of AGNs I. Imprints of individual scattering regions

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Spectropolarimetry of AGNs is a powerful tool for studying the structure and kinematics of the inner regions of quasars. We wish to investigate the effects of various AGN scattering region geometries on the polarized flux. We introduce a new, publicly available Monte Carlo radiative transfer code, STOKES, which models polarization induced by scattering off free electrons and dust grains. We model a variety of regions in AGNs. We find that the shape of the funnel of the dusty torus has a significant impact on the polarization efficiency. A compact torus with a steep inner surface scatters more light toward type-2 viewing angles than a large torus of the same half-opening angle, θ_0. For $\theta_0 < 53^\circ$, the scattered light is polarized perpendicularly to the symmetry axis, whilst for $\theta_0 > 60^\circ$ it is polarized parallel to the symmetry axis. In between these intervals the orientation of the polarization depends on the viewing angle. The degree of polarization ranges between 0% and 20% and is wavelength-independent for a large range of θ_0. Observed wavelength-independent optical and near-UV polarization thus does not necessarily imply electron scattering. Spectropolarimetry at rest-frame wavelengths less than 2500 Å may distinguish between dust and electron scattering but is not conclusive in all cases. For polar dust, scattering spectra are reddened for type-1 viewing angles, and made bluer for type-2 viewing angles. Polar electron-scattering cones are very efficient polarizers at type-2 viewing angles, whilst the polarized flux of the torus is weak. We predict that the net polarization of Seyfert-2 galaxies decreases with luminosity, and conclude that the degree of polarization should be correlated with the relative strength of the thermal IR flux. We find that a flattened, equatorial, electron-scattering disk, of relatively low optical depth, reproduces type-1 polarization. This is insensitive to the exact geometry, but the observed polarization requires a limited range of optical depth.

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Reverberation Mapping of High-Luminosity Quasars: First Results

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Reverberation mapping of nearby active galactic nuclei has led to estimates of broad-line-region (BLR) sizes and central-object masses for some 37 objects to date. However, successful reverberation mapping has yet to be performed for quasars of either high luminosity (above $L_{\rm opt} \sim 10^{46}$ erg s^{-1}) or high redshift ($z \gtrsim 0.3$). Over the past six years, we have carried out, at the Hobby-Eberly Telescope, rest-frame-ultraviolet spectrophotometric monitoring of a sample of six quasars at redshifts $z = 2.2-3.2$, with luminosities of $L_{\rm opt} \sim 10^{46.4}$–$10^{47.6}$ erg s^{-1}, an order of magnitude greater than those of previously mapped quasars. The six quasars, together with an additional five having similar redshift and luminosity properties, were monitored photometrically at the Wise Observatory during the past decade. All 11 quasars monitored show significant continuum variations of order 10–70%. This is about a factor of two smaller variability than for lower luminosity quasars monitored over the same rest-frame period. In the six objects which have been spectrophotometrically monitored, significant variability is detected in the C IVλ1550 broad emission line. In several cases the variations track the continuum variations in the same quasar, with amplitudes comparable to, or even greater than, those of the corresponding continua. In contrast, no significant Lyα variability is detected in any of the four objects in which it was observed. Thus, UV lines may have different variability trends in high-luminosity and low-luminosity AGNs. For one quasar, S5 0836+71 at $z = 2.172$, we measure a tentative delay of 595 days between C IV and UV-continuum variations, corresponding to a rest-frame delay of 188 days and a central black-hole mass of $2.6 \times 10^9 M_\odot$.

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Near-infrared spectra of Seyfert galaxies and line production mechanisms 9 10

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New observations are reported of J-band spectra ($1.04\,\mu$m – $1.4\,\mu$m) of three Seyfert 2 galaxies, Mkn 34, Mkn 78 and NGC 5929. In each case the spectral range includes the near-infrared lines of [FeII], [PII], HeI and Paβ. Each Seyfert galaxy has a known radio jet, and we investigate the infrared line ratios of the nuclear and extended regions of each galaxy compared to the radio structure. In Mkn 34 there is a clear indication of an extranuclear region, probably coincident with a shock induced by the radio jet, in which [FeII] is considerably enhanced, although the nuclear emission is almost certainly the result of photoionization by the continuum of the active nucleus. Similar effects in extranuclear regions are seen in the other objects, in the case of Mkn 78 confirming recent studies by Ramos Almeida et al. A possible detection of extranuclear [PII] emission suggests, if real, that photoionization by the active nucleus is the dominant line excitation mechanism over the whole source, including the regions coincident with the radio jet.

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An Update on the X-ray transient Narrow-Line Seyfert 1 galaxy WPVS 007: *Swift* observations of UV variability and persistence of X-ray faintness

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We report on the detection of UV variability and the persistence of X-ray faintness of the X-ray transient Narrow-Line Seyfert 1 galaxy WPVS 007 based on the first year of monitoring this AGN with *Swift* between 2005 October and 2007 January. WPVS 007 has been an unusual source. While being X-ray bright during the ROSAT All-Sky Survey it has been extremely faint in all following X-ray observations. *Swift* also finds this NLS1 to be X-ray faint and not detected in the *Swift* X-Ray Telescope at an 3σ upper limit of 2.6×10^{-17} W m^{-2} in the 0.3-10.0 keV band and confirms that the AGN is still in a low state. During the 2006 July and December observations with *Swift*'s UV-Optical Telescope (UVOT) the AGN became fainter by about 0.2 mag in the UV filters and by about 0.1 mag in V, B, and U compared with the 2005 October to 2006 January and 2006 September/October observations followed by a rebrightening in the 2007 January observation. This variability can be caused either by a change in the absorption column density and therefore the reddening in the UV, or by flux variations of the central engine. We also noticed that the flux in the UVOT filters agree with earlier measurements by the International Ultraviolet Explorer taken between 1993-1995, but spectra taken by the Hubble Space Telescope Faint Object Spectrograph show that WPVS 007 was fainter in the UV by a factor of at least 2 in 1996. The flat optical/UV spectrum suggests that some UV extinction is present in the spectrum, but that alone cannot at all account for the dramatic fading in the X-ray flux. Most likely we see a partial covering absorber in X-rays. Alternatively, the current X-ray emission seen from WPVS 007 may also be the emission from the host galaxy.

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FIRST 'Winged' and 'X'-shaped Radio Source Candidates

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A small number of double-lobed radio galaxies (17 from our own census of the literature) show an additional pair of low surface brightness 'wings', thus forming an overall 'X'-shaped appearance. The origin of the wings in these radio sources is unclear. They may be the result of back-flowing plasma from the currently active radio lobes into an asymmetric medium surrounding the active nucleus, which would make these ideal systems in which to study thermal/non-thermal plasma interactions in extragalactic

radio sources. Another possibility is that the wings are the aging radio lobes left over after a (rapid) realignment of the central supermassive black-hole/accretion disk system due perhaps to a merger. Generally, these models are not well tested; with the small number of known examples, previous works focused on detailed case studies of selected sources with little attempt at a systematic study of a large sample. Using the VLA-FIRST survey database, we are compiling a large sample of winged and X-shaped radio sources for such studies. As a first step toward this goal, an initial sample of 100 new candidate objects of this type are presented in this paper. The search process is described, optical identifications from available literature data, and basic radio data are presented. From the limited resolution FIRST images (∼5"), we can already confidently classify a sufficient number of these objects as having the characteristic wing lengths >80% of the active lobes to more than double the number of known X-shaped radio sources. We have also included as candidates, radio sources with shorter wings (<80% wing to lobe length ratios), or simply 'winged' sources, as it is probable that projection effects are important. Finally, among the candidates are four quasars (z=0.37 to 0.84), and several have morphologies suggestive of Fanaroff-Riley type-I (low-power) radio galaxies. While followup observations are necessary to confirm these identifications, this stresses the importance of source orientation and imaging limitations in finding these enigmatic objects.

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Spatially resolved X-ray spectra of NGC 4258

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We report a spatially resolved, X-ray spectral analysis of NGC 4258 using archival *Chandra* and *XMM-Newton* observations. The *XMM-Newton* spectra of the nuclear region are well described by two power-law components, a soft (0.57 keV) ther mal component, and an Fe Kα line with EW = 40 ± 33 eV. The properties of the second, weaker power-law component are similar to those of an off-nuclear source 2.5″ SW of the nucleus. The spectrum of the extended emission of th e entire galaxy is well described by two thermal components (MEKAL) models with temperatures ≃ 0.60 and 0.22 keV. The *Chandra* and *XMM-Newton* spectra along the anomalous arms show that the absorbing column density to the SE anomalous ar m is consistent with absorption by gas in our Galaxy, while the absorbing column to the NW anomalous arm is higher, indicating that the NW arm is partially on the far side of the galactic disk. The combined *Chandra* data clearly detect the X-ray em ission from the hot spots at the end of the approximately N-S radio jets. By assuming the hot spots represent shocked thermal gas at the ends of the jets, we estimate shock powers of $\simeq 3 \times 10^{39} f^{-1/2}$ erg s^{-1} (f is the filling facto r), similar to the radiative power in the inner anomalous arms, consistent with the notion that the jets could be responsible for heating the gas in the anomalous arms.

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Circumnuclear Star Clusters in the Galaxy Merger NGC 6240, Observed with Keck Adaptive Optics and HST

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We discuss images of the central ∼10 kpc (in projection) of the galaxy merger NGC 6240 at H and K' bands, taken with the NIRC2 narrow camera on Keck II using natural guide star adaptive optics. We detect 28 star clusters in the NIRC2 images, of which only 7 can be seen in the similar-spatial-resolution, archival WFPC2 Planetary Camera data at either B or I bands. Combining the NIRC2 narrow camera pointings with wider NICMOS NIC2 images taken with the F110W, F160W, and F222M filters, we identify a total of 32 clusters that are detected in at least one of these 5 infrared ($\lambda_c > 1$ μm) bandpasses. By comparing to instantaneous burst, stellar population synthesis models (Bruzual & Charlot 2003), we estimate that most of the clusters are consistent with being ∼15 Myr old and have photometric masses ranging from $7 \times 10^5 M_\odot$ to $4 \times 10^7 M_\odot$. The total contribution to the star formation rate (SFR) from these clusters is approximately $10 M_\odot$ yr^{-1}, or ∼10% of the total SFR in the nuclear region. We use these newly discovered clusters to estimate the extinction toward NGC 6240's double nuclei, and find values of A_V as high as 14 magnitudes along some sightlines, with an average extinction of $A_V \sim 7$ mag toward sightlines within ∼ 3 arcsec of the double nuclei.

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The size of BLRs of low luminosity Active Galactic Nuclei

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We study the size of BLRs of low luminosity Active Galactic Nuclei, also called 'dwarf AGN', defined as having ($L_{H\alpha} \leq 10^{41}\mathrm{erg\cdot s^{-1}}$). We more than double the sample size analyzed previously (Wang & Zhang 2003, hereafter Paper I). In this study we first confirm our previous result that the sizes of BLRs of low luminosity AGN are larger than the ones expected from the empirical relation $R_{BLRs} - L_{H\alpha}$ valid for 'normal' AGN: Seyfert 1s and quasars, except for the objects with accretion rate $\dot{m_{H\alpha}} > 10^{-5.5}$. Second, we find a positive correlation between the line width of the narrow emission line (as tracer of velocity dipersion and thus bulge and black hole mass) and the size of BLRs for both normal and low luminosity AGN. In this paper we find a non-linear dependence of the BLRs sizes of low luminosity AGN on BH masses. We also show that their sizes of BLRs are more strongly dominated by the 'specific accretion rate' $\dot{m_{H\alpha}}$ defined as $\dot{m_{H\alpha}} = L_{H\alpha}/L_{Edd}$, than by the masses of their cetral black holes. As an expected result, the distance of emission regions of low-ionization broad Hα of NGC 4395 should be consistent with the value from the empirical relation of $R_{BLRs} - L_{H\alpha}$, according to the high accretion rate

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The properties of optical FeII emission lines of AGN with double-peaked broad emission lines

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We study the FeII properties of double-peaked broad low-ionization emission line AGN (dbp emitters) using a sample of 27 dbp emitters from SDSS (DR4). Our first result is that the line spectra in the wavelength range from 4100$\mathring{A}$ to 5800$\mathring{A}$ can be best fitted by an elliptical accretion disk model. The best fitted results indicate that the optical FeII emission lines of dbp emitters originate from the same region in the accretion disk where the double-peaked Balmer emission lines originate. Some correlations between FeII emission lines and the other broad emission lines for normal AGN can be confirmed for dbp emitters. However, these results should be taken with caution due to the small number of objects and the bias in selecting strong FeII emitters. We show that for dbp emitters, BH masses seems to have more influence on FeII properties than dimensionless accretion rate.

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The sizes of BLRs and BH masses of double-peaked broad low-ionization emission line objects

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In this paper, the sizes of the BLRs and BH masses of DouBle-Peaked broad low-ionization emission line emitters (dbp emitters) are compared using different methods: virial BH masses vs BH masses from stellar velocity dispersions, the size of BLRs from the continuum luminosity vs the size of BLRs from the accretion disk model. First, the virial BH masses of dbp emitters estimated by the continumm luminosity and line width of broad Hβ are about six times (a much larger value, if including another dbp emitters, of which the stellar velocity dispersions are traced by the line widths of narrow emission lines) larger than the BH masses estimated from the relation $M_{BH} - \sigma$ which is a more accurate relation to estimate BH masses. Second, the sizes

of the BLRs of dbp emitters estimated by the empirical relation of $R_{BLR} - L_{5100\mathring{A}}$ are about three times (a much larger value, if including another dbp emitters, of which the stellar velocity dispersions are traced by the line widths of narrow emission lines) larger than the mean flux-weighted sizes of BLRs of dbp emitters estimated by the accretion disk model. The higher electron density of BLRs of dbp emitters would be the main reason which leads to smaller size of BLRs than the predicted value from the continuum luminosity.

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Lyα excess in high redshift radio galaxies: a signature of star formation.

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About 54% of radio galaxies at $z \geq 3$ and 8% of radio galaxies at $2 \leq z < 3$ show unusually strong Lyα emission, compared with the general population of high redshift ($z \geq 2$) radio galaxies. These Lyα-excess objects (LAEs) show Lyα/HeII values consistent with or *above* standard photoionization model predictions.

We reject with confidence several scenarios to explain the unusual strength of Lyα in these objects: shocks, low nebular metallicities, high gas densities and absorption/scattering effects. We show that the most successful explanation is the presence of a young stellar population which provides the extra supply of ionizing photons required to explain the Lyα excess in at least the most extreme LAEs (probably in all of them). This interpretation is strongly supported by the tentative trend found by other authors for $z \geq 3$ radio galaxies to show lower UV-rest frame polarization levels, or the dramatic increase on the detection rate at submm wavelengths of $z > 2.5$ radio galaxies. The enhanced star formation activity in LAEs could be a consequence of a recent merger which has triggered both the star formation and the AGN/radio activities.

The measurement of unusually high Lyα ratios in the extended gas of some high redshift radio galaxies suggests that star formation activity occurs in spatial scales of tens of kpc.

We argue that, although the fraction of LAEs may be incompletely determined, both at $2 \leq z < 3$ and at $z \geq 3$, the much larger fraction of LAEs found at $z \geq 3$ is a genuine redshift evolution and not due to selection effects. Therefore, our results suggest that the radio galaxy phenomenon is more often associated with a massive starburst at $z > 3$ than at $z < 3$.

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Giant Lyα nebulae in the high redshift ($z \geq 2$) Universe

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High redshift radio galaxies ($z \geq 2$) are believed to be progenitors of the giant ellipticals of today. They are often associated with giant Lyα nebulae (sometimes >100 kpc), which have been for more than two decades valuable sources of information about the evolutionary status of the host galaxy and its chemical enrichment and star formation histories.

I present in this paper a summary of the most relevant results about the giant nebulae obtained in the last ~10 years and the implications on our understanding of the early phases of evolution of massive elliptical galaxies. An interesting earlier review can be found in McCarthy (1993).

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Chemical enrichment of the intracluster medium by FR II radio sources

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We present 2D axisymmetric hydrodynamic simulations investigating the long term effect of FR II radio galaxies on the metal distribution of the surrounding intra-cluster medium (ICM). A light jet is injected into a cooling flow atmosphere for $10-30$ Myr. We then follow the subsequen evolution for 3 Gyr on a spherical grid spanning 3 Mpc in radius. A series of passive tracer particles were placed in an annulus about the cluster core to simulate metal carrying clouds in order to calculate the metallicity (Z) as a function of time and radial distance from the cluster centre. The jet has a significant effect on the ICM over the entire 3 Gyr period. By the end of the simulations, the jets produced metallicities of $\approx$ 10% of the initial metallicity of the cluster core throughout much of the cluster. The jets transport the metals not only in mixing regions, but also through upwelling IC behind the jet, enriching the cluster over both long and short distances.

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Line Variability in the High-Resolution X-Ray Spectrum of MCG -6-30-15

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The recent 540 ks Chandra HETGS spectrum of the well-studied, variable active galactic nucleus (AGN) MCG -6-30-15 shows strong $1s-2p$ absorption lines from many ions. The spectrum was obtained over a period of about 10 days, and the large number of counts in the spectrum makes it ideal for testing variability on short timescales. We apply quantitative tests for line variability to the $1s-2p$ absorption lines of H- and He-like Ne, Mg, Si, and S. We find significant correlations and anticorrelations between lines as a function of time, much as we would expect if ionization levels in the absorber were varying. We also find evidence for variation in at least one $1s-2p$ resonance absorption line as a function of luminosity. We consider several possibilities to explain the line variation. First we consider factors that could change ionization levels in the absorber: radial motion, density variation, luminosity variation, and continuum shape variation. None of these individually can explain the line variation, although we cannot completely constrain continuum shape variation without simultaneous knowledge of the ultraviolet (UV) continuum. Other factors, considered individually, are also unable to explain all the variation: multiple changing continuum components, variable obscuration, and changes in velocity dispersion. Changes in line emission are an unlikely cause of significant variation in absorption-line measurements, but we are unable to fully constrain them. Variability could be due to a changing line of sight through a structured absorber. Modeling such scenarios should produce useful constraints on continuum emission mechanisms and absorber structure.

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Giant Lyα nebulae around z>2 radio galaxies: evidence for infall

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We present an investigation into the possible relationship between side-to-side asymmetries of powerful radio galaxies at high redshift, with the goal of understanding the geometry, orientation and gas dynamics of these sources. Our sample consists of 1 1 radio galaxies at $2.3 \leq z \leq 3.6$ previously known to have giant, kinematically quiescent nebulae. We identify several correlated asymmetries: on the side of the brightest radio jet and hotspot (i) the redshift of the kinematically quiescent nebula i s highest, (ii) Lyα is brighter relative to the other lines and continuum, (iii) the radio spectrum is flattest and (iv) the radio structure has its highest polarization. These asymmetries are not found to be correlated with either the radio arm l ength asymmetry or the brightness asymmetry of the UV-optical emitting material. The correlation between the radio brightness asymmetry and the radial velocity of the quiescent gas also appears to be present in powerful radio galaxies with $0 \leq z \leq 1$.

Collectively, these asymmetries are most naturally explained as an effect of orientation, with the quiescent nebulae in infall: this is the first study to distinguish between the rotation, infall, outflow and chaotic motion scenarios for the kinematically quiescent emission line nebulae around powerful active galactic nuclei.

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The Environment of Local Ultraluminous Infrared Galaxies

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The spatial cluster-galaxy correlation amplitude, B_{gc}, is computed for a set of 76 $z < 0.3$ ultraluminous infrared galaxies (ULIRGs) from the 1-Jy sample. The B_{gc} parameter is used to quantify the richness of the environment within 0.5 Mpc of each ULIRG. We find that the environment of local ULIRGs is similar to that of the field with the possible exceptions of a few objects with environmental densities typical of clusters with Abell richness classes 0 and 1. No obvious trends are seen with redshift, optical spectral type, infrared luminosity, or infrared color (f_{25}/f_{60}). We compare these results with those of local AGNs and QSOs at various redshifts. The 1-Jy ULIRGs show a broader range of environments than local Seyferts, which are exclusively found in the field. The distribution of ULIRG B_{gc}-values overlaps considerably with that of local QSOs, consistent with the scenario where some QSOs go through a ultraluminous infrared phase. However, a rigorous statistical analysis of the data indicates that these two samples are not drawn from the same parent population. The B_{gc} distribution of QSOs shows a distinct tail at high B_{gc}-values which is not apparent among the ULIRGs. This difference is consistent with the fact that some of the QSOs used for this comparison have bigger and more luminous hosts than the 1-Jy ULIRGs.

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Stratified Quasar Winds: Integrating X-ray and Infrared Views of Broad Absorption Line Quasars

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Quasars are notable for the luminous power they emit across decades in frequency from the far-infrared through hard X-rays; emission at different frequencies emerges from physical scales ranging from AUs to parsecs. Each wavelength regime thus offers a different line of sight into the central engine and a separate probe of outflowing material. Therefore, obtaining a complete accounting of the physical characteristics and kinetic power of quasar winds requires a panchromatic approach. X-ray and infrared studies are particularly powerful for covering the range of interesting physical scales and ionization states of the outflow. We present a stratified wind picture based on a synthesis of multiwavelength research programs designed to constrain the nature of mass ejection from radio-quiet quasars. This wind comprises three zones: the highly ionized shielding gas, the UV broad absorption line wind, and the cold dusty outflow. The primary launching mechanism for the wind likely varies in each zone. While radiative acceleration on resonance lines dominates for the UV absorbing wind, the shielding gas may instead be driven by magnetic forces. Ultraviolet continuum radiative pressure, perhaps coupled with magnetic launching, accelerates a dusty outflow that obscures the inner broad line region in unification schemes.

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Response of the warm absorber cloud to a variable nuclear flux in active galactic nuclei

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Recent modeling of the warm absorber in active galactic nuclei has proved the usefulness of constant total (gas plus radiation) pressure models, which are highly stratified in temperature and density. We explore the consistency of those models when the typical variation of the flux from the central source is taken into account. We perform a variability study of the warm absorber response, based on timescales and our photoionization code TITAN. We show that the ionization and recombination timescales are much shorter than the dynamical timescale. Clouds very close to the central black hole will maintain their equilibrium since the characteristic variability timescales of the nuclear source are longer than cloud timescales. For more distant clouds, the density structure has no time to vary, in response to the variations of the temperature or ionization structure, and such clouds will show the departure from the constant pressure equilibrium. We explore the impact of this departure on the observed properties of the transmitted spectrum and soft X-ray variability: (i) non uniform velocities, of the order of sound speed, appear due to pressure gradients, up to typical values of 100 km s^{-1}. These velocities lead to the broadening of lines. This broadening is usually observed and very difficult to explain otherwise. (ii) Energy-dependent fractional variability amplitude in soft X-ray range has a broader hump around $\sim$ 1–2 keV, and (iv) the plot of the equivalent hydrogen column density vs. ionization parameter is steeper than for equilibrium clouds. The results have the character of a preliminary study and should be supplemented in the future with full time-dependent radiation transfer and dynamical computations.

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Night-to-night variation in the emission lines of the nucleus spectrum of the Seyfert galaxy NGC 3227

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The results of the emission line study of the optical spectrum of the Seyfert galaxy NGC 3227 nucleus are presented. 53 spectra obtained during the maximum nucleus brightness on 12-15 January 1977 with the 6 m telescope were the basis of the investigations. It was shown that the profilers of the hydrogen lines broadening during 3 days. The amounts of broadening at the 0.5 intensity level of H_{α}, H_{β} and $H_{g}amma$ line profile peaks were 12%, 35% and 44% respectively. The H_{β} line profile broadening was accompanied by a decrease in its equivalent width EW_{β}. The increase in the equivalent width $EW_{[OIII]}$ of the [OIII] line during 3 days was more than 3σ. It was assumed that a 3 day flare is observed in the galaxy nucleus, which could be caused by shock in long-lived flows from the galaxy nucleus

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