Active Galaxies Newsletter	*An electronic publication dedicated to the observation and theory of active galaxies*
No. 46 — January 2001	Editor: Rob Beswick (rb@ast.man.ac.uk)

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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

A MERLIN Neutral Hydrogen Absorption study of the Luminous Infrared Merger NGC 6240

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We present neutral hydrogen absorption observations of the luminous infrared merger NGC 6240 using MERLIN with a resolution of 0.2 arcseconds. Broad absorption (a few hundred kms^{-1}) has been found against two compact radio sources within the central kiloparsec providing dynamical information about the neutral gas components in front of these sources. A narrow absorption component is also detected superimposed upon this broad absorption and additionally against some of the extended L-band continuum. From these results we deduce that the broad co mponent is a result of absorption by a highly disturbed disk-like structure of neutral gas aligned along the position angle of the two compact radio sources, similar to the model previously proposed by Tacconi et al. (1999) based on spectral CO emission data. The narrow component is likely to arise from absorption by less disturbed neutral gas at much larger scales within the system.

Continuum observations, at 1.4 and 5 GHz, presented here support the view that NGC 6240 contains a double nucleus, resulting from a galactic merger event and show these as two compact radio sources separated by 1.52 arcseconds. We have also applied luminosity and morphological considerations to the continuum results to determine the most feasible source of radio emission for this luminous merger galaxy. We conclude that the most likely source of the radio flux found in NGC 6240 is a combination of starburst emission from radio luminous supernova remnants, similar to those found in Arp 220, and emission from a weak AGN probably triggered by a merger event.

Accepted by MNRAS

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Tunable-filter imaging of quasar fields at $z \sim 1$. I. A cluster around MRC B0450–221

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Using a combination of multicolour broad- and narrow-band imaging techniques and follow-up spectroscopy, we have detected an overdensity of galaxies in the field of quasar MRC B0450−221, whose properties are consistent with a cluster at the quasar redshift $z = 0.9$. An excess of red galaxies ($V - I > 2.2$, $I - K' \geq 3.8$) is evident within $1'$ of the quasar, with the colours expected for galaxies at $z = 0.9$ that have evolved passively for 3 Gyr or more. A number of line-emitting galaxies (nine candidates with equivalent widths $W_\lambda > 70$ Å) are also detected in the field using the TAURUS Tunable Filter (TTF). Three have been confirmed spectroscopically to indeed lie at $z = 0.9$. The TTF candidates with the strongest [O II] line emission cluster in a group which lies 200–700 kpc away from the quasar and the red galaxy excess, and therefore most likely on the outskirts of the cluster. These observations are the first in a series probing quasar environments at $z \sim 1$ with TTF.

Accepted by Astron. J. (astro-ph/0012326)

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The Optical-Near-IR Spectrum of the M87 Jet From HST Observations

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We present 1998 HST observations of M87 which yield the first single-epoch optical and radio-optical spectral index image of the jet at 0.15" resolution. We find $\langle\alpha_{ro}\rangle \approx 0.67$, comparable to previous measurements, and $\langle\alpha_o\rangle \approx 0.9$ ($F_\nu \propto \nu^{-\alpha}$), slightly flatter than previous workers. Reasons for this discrepancy are discussed. These observations reveal a large variety of spectral slopes. Bright knots exhibit significantly flatter spectra than interknot regions. The flattest spectra ($\alpha_o \sim 0.5 - 0.6$; comparable to or flatter than α_{ro}) are found in the two inner jet knots (D-East and HST-1) which contain the fastest superluminal components. The flux maximum regions of other knots have $\alpha_o \sim 0.7 - 0.9$.

The maps of α_o and α_{ro} appear poorly correlated. In knots A, B and C, α_o and α_{ro} are essentially anti-correlated with one another. Near the flux maxima of two inner jet knots (HST-1 and F), changes in α_{ro} appear to lag changes in α_o, but in two other knots (D and E), the opposite relationship is observed. This is further evidence that the radio and optical emissions of the M87 jet come from substantially different physical regions. The delays observed in the inner jet are consistent with localized particle acceleration in the knots, with $t_{acc} << t_{cool}$ for optically emitting electrons in knots HST-1 and F, and $t_{acc} \sim t_{cool}$ for optically emitting electrons in knots D and E. Synchrotron models fit to the radio-optical data yield $\nu_B \sim 10^{16}$ Hz for knots D, A and B, and somewhat lower values, $\nu_B \sim 10^{15} - 10^{16}$ Hz, in other regions of the jet. If the X-ray emissions from knots A, B and D are co-spatial with the optical and radio emission, we can strongly rule out the "continuous injection" model, which overpredicts the X-ray emissions by large factors. Because of the short lifetimes of X-ray synchrotron emitting particles, the X-ray emission likely traces sites of particle acceleration and fills volumes much smaller than the optical emission regions.

Jet directions in Seyfert galaxies: Radio continuum imaging data

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We present the results of VLA A-array 8.46 GHz continuum imaging of 55 Seyfert galaxies (19 Seyfert 1's and 36 Seyfert 2's). These galaxies are part of a larger sample of 88 Seyfert galaxies, selected from mostly isotropic properties, the flux at 60μm and warm infrared 25μm to 60μm colors. These images are used to study the structure of the radio continuum emission of these galaxies and their position angles, in the case of extended sources. These data, combined with information from broad-band B and I observations, have been used to study the orientation of radio jets relative to the plane of their host galaxies (Kinney et al. 2000).

To appear in The Astrophysical Journal Supplement Series, February 2001

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Print available on astro-ph/0012123