1990

5.11

N_2H^+ in Warm and Cold Clouds

M. Womack, L.M. Ziurys, S. Wyckoff (Ariz. St. Univ.)

A systematic survey of N_2H^+ has been conducted towards thirteen warm and four cold, dense interstellar clouds using the NRAO 12-m telescope at Kitt Peak. The $J = 1 \rightarrow 0$ and $J = 3 \rightarrow 2$ rotational transitions of this species were observed at 93 and 279 GHz respectively, as well as the $J = 1 \rightarrow 0$ line of the isotope ($N^{15}NH^+$) at 91 GHz.

The $J = 3 \rightarrow 2$ transition was detected in all warm clouds, including NGC7538, Orion-KL, Orion-S, W51 and SgrB2. The emission in this line was fairly strong, suggesting that N_2H^+ is present in hot, dense gas, which might be unexpected for a molecular ion. Also, the $N^{15}NH^+$ isotope transition was observed for the first time towards NGC7538, Orion-KL, SgrB2(OH), SgrB2N, W51D and W51M.

Column densities of N_2H^+ and excitation conditions of the clouds determined from LVG modeling will be presented. Abundances will be established for comparison with chemical models. In addition, an estimate of the interstellar N_2 will be derived from the N_2H^+ measurements.

Session 6: Radio Galaxies and Jets
Display Session, Ballroom C

6.01

The "Partial Jets" and Radio Polarization of 3C219

A.H.Bridle (NRAO), D.A.Clarke (NCSA), J.O.Burns (NMSU), R.A.Perley (NRAO) and M.L.Norman (NCSA).

Both the main jet and the counterjet in the "classical double" radio galaxy 3C219 (0917+458) are "partial jets", i.e. they seem to disappear long before reaching the hot spots in the associated radio lobes. The disappearance of the main jet is accompanied by a transition from axial to transverse magnetic field along the jet axis.

We present new multi-frequency VLA observations of 3C219 that determine the spectral and polarimetric properties of the source. The magnetic field structure in the lobes is consistent with the expansion of a passive helical magnetic field transported by each of the jets. We argue that the synchrotron emissivity of the brighter parts of the jets is enhanced by oblique hydrodynamical shocks rather than by the self-collimation of internal J x B forces.

We also consider two interpretations for the "partial jets" - a "born-again" relativistic jet model that assumes an episodic behavior in the outflow from the nucleus of 3C219, and a passive magnetic field model. The former accounts for several of the asymmetries between the jet and the counterjet. The latter accounts for much of the observed radio polarization structure and also shows that the emissivity of an uninterrupted jet may fall off suddenly, giving the illusion of a "partial jet". We discuss ways to distinguish these alternative models of 3C219.

6.02

MEM Polarization Imaging of VLBI Data of 3C 273, 1928+738, and 0711+356: What CLEAN Doesn't Tell You

M. A. Holdaway (*NRAO*), J. F. C. Wardle, and D. H. Roberts (*Brandeis University*)

Milliarcsecond (mas) resolution total intensity (I) and linear polarization (P) images of the quasars 3C 273, 1928+738, and 0711+356 made with the maximum entropy method (MEM) are compared with CLEAN images made from the same data set. MEM's poor performance removing sidelobes from bright unresolved features is effectively solved by cleaning the cores, subtracting the clean components in the (u, v) plane, and imaging the extended structure with MEM.

In 3C 273, the jet extends to 60 milliarcseconds in the MEM I and P images, twice the extent of the CLEAN images. The degree of polarization increases out to 25 mas and then decreases to about 10% further out. The magnetic field orientation is complicated in the inner 15 mas, but is oriented parallel to the jet beyond 15 mas.

The jet in 1928+738 is imaged out to 75 mas with MEM. The jet appears to change direction about 10 times. Outside the core, the magnetic field is roughly parallel to the jet except at one bend in which the field orientation goes through a 180° flip.

No extended features were found in the 0711+356 MEM images. Due to MEM's superresolution, the northern component is clearly resolved, and a lower limit is placed on the polarization of the southern component than the CLEAN image allows, strengthening the identification of the southern component as the core. The magnetic field orientation in the northern component changes smoothly over 4 mas in the MEM image, but is broken up into two discrete components with different magnetic field orientation in the CLEAN image.

6.03

Morphological Comparisons of Jets and Counter Jets in Classical FR I Type Sources.

By B. Stevens and J.P. Basart (Iowa State University)

Investigators in many previous studies of extragalactic radio jets have examined FR I and FR II type jets, and compared observational parameters such as collimation, surface luminosity, projected length, and magnetic field configuration between the dominant jets in the FR I sources and the jets in FR II sources. While there have been many contributions to the debate centering around the question of sidedness, less attention has been given to the asymmetric structure of the jets in FR I sources.

In the past several years there have been a been a number of papers published which present observations of collections of extended edge-brightened double sources (Jägers, W.J., 1987, *Astr. Ap. Suppl.* 71, 75), and (Parma, P., Fanti, C., Fanti, R., Marganti, R., de Ruiter, H.R., 1987, *Astr. Ap.* 181, 244). In observations of over one hundred B2 sources Parma *et al.*, have published data on 21 sources which are two sided and are classified as either FR I type sources or transitional cases.

We are studying the discernable structural simalarities and differences in jets and counter jets in two-sided sources. In initial investigations of the data of Parma *et al.* we have noticed a slight tendency for the opening angle in the counter jet to be larger than the opening angle in the more dominant jet. A progress report of this on going study is presented and the implications of our findings on the sidedness debate are discussed.

6.04

Depolarization Asymmetry in the Quasar 3C 47

I.Fernini (UNM), J.P.Leahy (NRAO/VLA), J.O.Burns (NMSU), J.P.Basart (ISU)

It has been reported recently that in many extended high luminosity extragalactic radio sources, the lobe on the jet side shows less depolarization than the lobe on the counterjet side. This depolarization asymmetry has been interpreted as being produced by an external foreground screen. Depolarization caused by an external medium supports the idea that the jets are relativistically