cm^{-1} (2.97 and 3.15 μm) to trace amounts of H_2O frozen on Io. The presence of H_2O on Io, even with the low abundance suggested here (< 1% SO_2), has important implications for the composition of the surface material and its spectral properties. Furthermore, it raises the important question of the source of hydrogen, i.e endogenic (H_2O release from the volcanic vents) vs. exogenic (H_2O production within the SO_2 surface ice layer by proton bombardment from the torus). More observations of this new feature are needed to assess its temporal variability. Higher resolution measurements are also needed to obtain the precise shape of this band since the laboratory data indicate the profile will provide useful information about the thermal history and H_2O concentration. The next generation of airborne observatory, SOFIA, with its higher sensitivity and spectral resolution, should provide the ideal instrument for such measurements on Io and other bodies of the solar system.

Reference:
Salama et al., Icarus **83**, 66 (1990).

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35.01

Mapping Magnetic Fields from Hat Creek

A. Goodman (Harvard University), C. Heiles (UC Berkeley), P. Myers (Harvard-Smithsonian Center for Astrophysics), R. Güsten (MPI, Bonn)

Near the end of its days, the 85-foot telescope at Hat Creek had gotten so good at H I Zeeman observing that one might even say the spectra were being "mass-produced." In a typical integration time of 10 hours, it was possible to measure fields on the order of 5 to 10 μG in a broad range of interstellar cloud environments. At this meeting, we will describe two magnetic field studies which were both completed just prior to the demise of the 85-foot.

Goodman and Heiles (1993, ApJ, in prep.) presents more than 50 independent Zeeman measurements of the field associated with the Ophiuchus dark cloud complex. The H I spectra in Ophiuchus show self-absorption features whose LSR velocities match those of the denser molecular gas in the region. The average field strength associated with the self-absorption features is $\sim$ 9 μG, with a dispersion $\sim$ 4 μG. The field strengths measured in Ophiuchus imply that magnetic and kinetic energy are similar for the gas associated with the field.

Myers, Goodman, Heiles and Güsten (1993, ApJ, in prep.) presents over 30 measurements of the H I Zeeman effect in high-latitude clouds. Many of the measurements are in the Ursa Major high-latitude cloud complex, where more than 20 independent observations serve to map out the structure of the line-of-sight field. Field strengths in Ursa Major run to almost 20 μG, and the field and column density structure appear correlated. One of the most interesting results of this work is that despite the fact that high-latitude clouds are typically far out of virial equilibrium (gravitational energy << kinetic energy), kinetic and magnetic energy appear to be comparable in these clouds, as they do in star-forming clouds, which are much closer to virial equilibrium.

35.02

Variability of Astrophysical Maser W49

Jeffrey Schuster, Don Backer and Carl Heiles (UCB)

We present data from the OH maser W49, a star forming region 14 kpc distant. The data were taken using the University of California 85 foot telescope at Hat Creek over a period of 83 days. These data are among the last taken at this facility before it was destroyed in a storm in January, 1993. The data consist of two spectra per day, separated by 15 hours. We monitored two emission features at 1665 MHz and 1667 MHz, in both right and left circular polarizations. We present here preliminary results from the first week of observation. A clean algorithm was implemented to pick out 15 features from each spectrum. All of these features appear to be stable at a few percent rms.

35.03

Geodetic VLBI Observations with the Hat Creek Telescope

D.B.Shaffer (Radiometrics Inc), for the NASA/GSFC Geodetic VLBI Group

Geodetic VLBI observations made with the Hat Creek 85′ antenna were important contributions to the NASA Crustal Dynamics Program (CDP). Among other things, the CDP studied motions of the Earth's crustal plates and deformation in the vicinity of the San Andreas Fault in California.

The 85′ antenna was one of the three fundamental anchor points in California east of the San Andreas fault that were used from 1983 to 1991 to determine the motions at various mobile VLBI sites along the San Andreas and to determine the Pacific plate motions at Vandenberg Air Force Base and Ft. Ord (California) and Kauai (Hawaii). The Hat Creek site itself was found to be moving 10.6$\pm$0.4 (one σ) mm/yr to the WNW (PA 305°) with respect to a "stable" eastern North America. Hat Creek is located near the western edge of the Northern Basin and Range province. Its motion is thought to be a combination of WNW extension across the Basin and Range, and a small component of NW elastic deformation due to the interaction between the North American and Pacific plates. Geodetic VLBI measurements from Hat Creek to the nearby Quincy and the more distant Ely (Nevada) and Platteville (Colorado) mobile sites were the key measurements in defining the extension rate for the Northern Basin and Range as 8 $\pm$ 2 mm/yr (PA $\sim$ 300°). Hat Creek was also the anchor point for measuring a 5 cm northward seismic displacement at the Ft. Ord mobile site due to the Loma Prieta earthquake.

We will show the motion of California and Pacific basin sites for which Hat Creek contributed important data.

35.04

Mosaiced HCO^+ Observations of W 43 with the BIMA array

Niranjan Thatte (U. C. Berkeley), Wm. J. Welch (U. C. Berkeley)

We present maps of the 3 millimeter continuum and the J=1$\rightarrow$0 transition of HCO^+ toward the massive star forming complex W 43. The composite images were formed by mosaicing 3 fields of the BIMA interferometer. Data from the 12 meter NRAO telescope provided the low spatial frequency information not accessible to the interferometer. We discuss the mosaicing process, with special attention to recovering large scale structure.

The source exhibits a very complex morphology. The continuum emission is extended with respect to the primary beam (2′ FWHM) of the BIMA array, which corresponds to a physical size of several parsecs. The 6} resolution images show at least 7 distinct continuum peaks. The HCO^+ emission is also very extended, with several compact components separated in velocity. The line emission exhibits a velocity spread of 20 km/s, with a large asymmetric red shifted wing. We also discuss model geometries for the structure of this complex region.

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36.01

Cosmic Background Radiation Anisotropy at 1.5°

Jeffrey Schuster, Todd Gaier, Joshua Gundersen, Peter Meinhold, Timothy Koch, Michael Seiffert, Carlos Alexandre Wuensche, and Philip Lubin (UCSB)

We report on further results from the University of California program to measure anisotropy in the Cosmic Background Radiation at angular scales near 1°, an angular scale corresponding approximately to seeds of super-clusters of galaxies. The data presented here are 13 sky temperature differences in a strip centered at right ascension $\alpha = 2^h$ and all at declination 63°. These data represent 64 hours of integration out of a total of 500 hours acquired while at the Amundsen-Scott South Pole station during the Austral summer of 1990-91. The telescope used was the Advanced Cosmic Microwave Explorer (ACME), a one meter off axis Gregorian Telescope. The detector was a 30% band width 30 GHz High Electron Mobility