

VLA Observations of Organic Molecules in the Low-Mass Protostellar System IRAS 16293-2422

Jeffrey A. Pedelty
Planetary Systems Laboratory
NASA's Goddard Space Flight Center
Greenbelt, MD 20771
USA
Jeff.Pedelty@nasa.gov

Lee G. Mundy
Department of Astronomy
University of Maryland
USA

We present VLA observations at 7mm of the hot molecular core (HMC) in the low-mass protostellar system IRAS 16293-2422, or I16293. This actively studied source is a deeply embedded protostellar system in the ρ Ophiucus cloud complex at a distance of only ~ 160 pc. I16293 is a binary system with sources A and B separated by $\sim 5''$. IRAM 30m observations by Cazaux et al. (ApJ, 2003, 593, L51) detected a rich inventory of highly saturated organic molecules, including formic acid, methyl formate, and ethyl cyanide. Kuan et al. (ApJ, 2004, 616, L27) recently published Submillimeter Array (SMA) maps of methyl formate, methanol, and other organic molecules that show the existence of an HMC in both sources A and B.

We observed I16293 in the 7mm transitions of methyl formate, formic acid, ethyl cyanide, and silicon monoxide during four D array sessions in July/August, 2004. We present spectra and images of methyl formate and formic acid in I16293 with spectral resolution ~ 49 kHz (~ 0.32 km/sec) and spatial resolution $\sim 2.9'' \times 1.6''$. The VLA and SMA images have essentially identical spatial resolutions, which facilitates their intercomparison. We obtain new temperature estimates by extending the rotation diagrams for methyl formate presented by Kuan et al. to include this lower energy 7mm transition ($E_u = 6.1$ K).