

INAOE 1996 Millimeter Summer School from July 15 to August 2, 1996

Title: Small Scale Structure of Clouds and Protostar Formation

Dr. William D. Langer

MS 169-506, Jet Propulsion Laboratory, California Institute of Technology, Pasadena, CA 91109

Abstract

I will give a series of lectures on the small scale structure of clouds and their relationship to protostar formation. We already know from previous work that large scale processes concentrate the interstellar molecular gas into a clumpy turbulent structure which evolve into dense cores. Instruments such as the OVRO-MMA have been used to study the structure, dynamics, and chemistry of these pre-protostellar cores and the evolution of these cores into protostars. In the future the LMT will provide critical observations at intermediate spatial resolutions between those of interferometers and existing single dish antennas. To illustrate this objective I will discuss three stages of star formation. In the Taurus Molecular Cloud 1, OVRO and DSN observations show that core D is a highly fragmented pre-protostellar structure (Langer et al. 1995). The smallest fragments are internally quiescent, very cold, a fraction of the size of the Oort cloud and about 0.01 to 0.1 M_{\odot} . In L1498 there is evidence that the coagulation of some of such fragments is building a pre-protostellar core (Kuiper et al. 1996). After a critical mass is reached the pre-protostellar core collapses. Material continues to accrete onto the central pre-planetary and disk. Finally I will discuss imaging the infall region of B335 with VLA and OVRO observations of CCS and CS, respectively (Velusamy et al. 1995). These show a clumpy chemically differentiated envelope structure. The research on which these lectures are based are supported by research grants to the Jet Propulsion Laboratory, California Institute of Technology from the National Aeronautics and Space Administration.

Kuiper, T. H. H., Langer, W. D., Velusamy, T., 1996, ApJ, in press

Langer, W. D., Velusamy, T., Kuiper, T. H. H., Levin, S., Olsen, V., and Migenes, V. 1995 ApJ 453, 293

Velusamy, T., Kuiper, T. H. H., Langer, W. D., 1995, ApJ 451, 1.75