[S13-1] Star Formation Efficiency in Driven, Supercritical, Turbulent Clouds

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We present measurements of the star formation efficiency (SFE) in three-dimensional numerical simulations of driven turbulence in supercritical, ideal-MHD, and nonmagnetic regimes characterized by a mean normalized mass-to-flux ratio μ, all with 64 Jeans masses and similar rms Mach numbers (~10). In most cases, the moderately supercritical runs with μ= 2.8 have significantly lower SFEs than the nonmagnetic cases, being comparable to observational estimates for entire molecular clouds (5% over 4 Myr). Also, as the mean field is increased, the number of collapsed objects decreases and the median mass of the collapsed objects increases. However, the largest collapsed-object masses systematically occur in the weak-field case, μ= 8.8. We thus suggest that the SFE may be monotonically reduced as the field strength increases from zero to subcritical values, rather than there being a discontinuous transition between the sub- and supercritical regimes.

[S13-2] Comparison of Model Calculation and Observational Results of the UV-Excited High Rotational Level H2 in Interstellar Clouds

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We have calculated 1080 interstellar cloud models with a PDR H2 model 'CLOUD' to investigate the formation and destruction of high rotational level H2 according to the combinations of five physical conditions: the incident UV intensity, the H2 column density, cloud temperature, total density, and the H2 formation rate coefficient. The model results show that the high rotational level ratio of H2, N(4)/N(0), is proportional to the incident UV intensity, and is inversely proportional to the H2 molecular fraction, as predicted in theories. In this process, we suggest a new method of measuring the total density of a cloud by observing the H2 rotational level column densities. We have referenced high resolution FUSE H2 spectra of 3 translucent clouds in the Galaxy and 24 diffuse clouds in the SMC and LMC to examine our models, and derived the densities of those clouds using the models. Also, we present the ORFEUS SPAS I and II survey results of interstellar H2 toward 54 sight lines in the Galactic disk and halo and compare them with our models.