Radiative transfer in 3D

Mika Juvela (Helsinki University Observatory), Paolo Padoan (Harvard University Department of Astronomy)

The high resolution provided by ALMA will reveal new small scale structures in many sources, e.g. in star forming regions. Such inhomogeneities may not have been considered in the analysis of past observations but they will be essential to the understanding of future data. Radiative transfer methods are needed to decipher the observations and the presence of complicated source structures and small scale inhomogeneities requires 3D models.

We will describe work we have done in modelling molecular line emission from inhomogeneous molecular clouds. Examples include the modelling of multitransitional CS observations of massive star forming cores where the clumpy density and velocity structures have a clear effect on the line emission (Juvela 1998). Some radiative transfer calculations based on the MHD models of interstellar clouds are also discussed (Padoan *et al.* 1998).

Our radiative transfer code is based on Monte Carlo simulation. We will show that radiative transfer calculations with large 3D models have already become practicable and that the Monte Carlo method can be applied also in cases of hight optical depths.

Juvela M. 1998, A&A, 329, 659

Padoan P., Juvela M., Bally J., Nordlund Å1998, ApJ, 504, 300

Abstract submitted for Science with the Atacama Large Millimeter Array, 6 – 8 October 1999, Washington, D. C.