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Radiative transfer modelling of cold interstellar matter

Wednesday, 8 June 2022 09:00 (30 minutes)

Radiative transfer modelling is an essential tool in star-forming studies, providing the connection between the complex physical reality within the interstellar medium and the radiation observed from it. Therefore, it is needed both in the analysis of observations and when predictions are made based on numerical simulations.

I will discuss the modelling of spectral lines and the dust emission and scattering, in the context of dense molecular clouds. The non-local nature of the radiative transfer problem, the high optical depths, and the large dynamical range of the models all cause practical challenges. I will examine, how (and if) these can be addressed with the use of hierarchical grids, GPU computing, and specific numerical methods. The examples range from the post-processing of MHD simulations, covering scales of hundreds of parsecs with up to billion volume elements, down to small one-dimensional models at the scale of individual cloud cores. I will also touch on one related problem, how to build a model that matches the observations of an individual object. I will end by discussing some future plans, for example, in the modelling of dust polarisation.

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