Contributed Talk

Splinter Computation

Line and continuum radiative transfer simulations: From magnetic fields to polarization

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The impact of magnetic fields on the formation of stars and planets is a matter of ongoing discussions. Measuring the structure and strength of magnetic fields in star-forming regions is therefore of crucial importance. Using radiative transfer simulations that consider the influence of magnetic fields, we provide predictions for observations and insights about internal physical properties from molecular clouds to circumstellar disks.

We present the 3D radiative transfer code POLARIS (Reissl et al. 2017, Brauer et al. 2017) that is able to simulate the emission of aligned non-spherical dust grains and the Zeeman splitting of spectral lines. Furthermore, we give a detailed overview of its abilities and potential applications. As an example, we show three already performed studies that take advantage of the key capabilities of POLARIS. In the first one, we investigate polarization holes in submm observations of Bok-Globules. The second study focuses on the uncertainty of the analysis method, which is usually used to estimate the magnetic field strength in the line-of-sight direction from Zeeman split spectral lines. Finally, we investigate which constraints for magnetic fields in circumstellar disks can be obtained from Zeeman observations of the 113 GHz CN lines.