Impact of stellar variability on the observational appearance of protoplanetary disks

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Abstract

The classical T Tauri star DR Tau, member of the Taurus-Auriga molecular cloud at a distance of about 140 pc, shows a very strong long- and short-term photometric and spectroscopic variability from the ultraviolet to the mid-infrared wavelength range. This variability is irregular, with no evidence of periodicity and no obvious discernible pattern. T Tauri stars are young stellar objects in the pre-main sequence stage, which typically show variations in brightness due to accretion, stellar winds, jets and clumps (protoplanets and planetesimals) in the disk surrounding them.

We investigate how the brightness variation of the star influences the appearance of the surrounding circumstellar disk of DR Tau through radiative transfer simulations using the Monte-Carlo code Mol3D. Finally, we compare the results of the simulations with the data recorded with the MID-infrared Interferometric instrument (MIDI) at the Very Large Telescope Interferometer (VLTI) at three different epochs separated by about nine years, two months, respectively.

The purpose of this thesis is to test the hypothesis that the variable star model is the underlying explanation for the observed variation of the brightness distribution of the circumstellar disk of DR Tau.

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