Effects of intense flaring activity on accretion disk of Classical T Tauri Stars

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Abstract

According to the magnetospheric accretion scenario Classical T Tauri Stars (CTTSs) are surrounded by a disk with which they exchange mass and angular momentum through mass accretion.
Despite the accretion process is a crucial aspect of star formation, some issues are still debated , as for example, how the material loses angular momentum and falls into the star. Moreover, CTTSs are characterized by a strong flaring activity. This energetic phenomena may influence the circumstellar environment, and perturb the stability of the disk if a very intense flare occurs in proximity of the disk (Orlando et al. 2011).
Starting from these considerations, in this work we investigate the effects on the disk of a train of low intensity flares randomly distributed on the disk surface. In particular we explore the conditions that might induce accretion episodes, through 3D magneto-hydrodynamical modeling. Our model takes into account the most important physical processes (among which thermal conduction and radiative cooling). We find that an intense flaring activity produces an hot extended corona which links the disk to the stellar surface. The flares can also significantly perturb the disk and trigger accretion phenomena leading to accretion rates comparable with those inferred from X-ray observations.

Keywords: Accretion, Disk, Classical T Tauri Stars

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