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Effects of Flaring activity on the disk of Classical T Tauri Stars

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 accretion of mass. Despite this process is a crucial aspect of star formation, some issues are still not clear; in particular how the material loses angular momentum and falls into the star. Moreover, in CTTSs strong flaring activity is a common feature. This energetic phenomena may influence the circumstellar environment. Recently, Reale et al. (2018) proved that long flares may connect the disk to the stellar surface. A study of Orlando et al. (2011) has shown that an intense flare close to the disk may strongly perturb the stability of the disk, inducing accretion episodes. Starting from these lines of evidence, in this work we investigate the effects of a storm of flares with low-to-medium intensity on the disk stability, and if they may be responsible to trigger accretion episodes. To this end, we developed a 3D magnetohydrodynamical model describing a CTTS surrounded by an accretion disk subject to intense flaring activity. The flares occur in proximity of a thick disk.

We found that the flaring activity determines the formation of a hot extended corona that links the disk to the stellar surface. In addition, the flares trigger accretion phenomena with a mass accretion rate comparable with those inferred by X-ray observations.