Tomographic Reconstruction of the Vertical Structure of Edge-On Protoplanetary Disks

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Protoplanetary disks are the sites of planet formation, and their vertical structure plays a key role in regulating temperature, chemistry, and irradiation. However, this structure is difficult to constrain observationally due to projection effects in moderately inclined systems. Highly inclined (edge-on) disks offer a unique opportunity to directly probe their vertical stratification. We apply the tomographically reconstructed distribution (TRD) method to ALMA ^{12}CO spectral line data obtained within the *DISKSTRAT* Large Programme (PI: R. Le Gal, Co-PI: F Ménard), with the aim of recovering the brightness temperature distribution in cylindrical coordinates, ($T_b(R, Z)$). This technique exploits the Keplerian velocity field to map emission from position-velocity space into disk-centric coordinates, providing a relatively model-independent view of the disk structure.

We present TRD maps for a sample of edge-on disks and the reconstructed distributions reveal a vertically stratified structure, characterized by a warm molecular layer located above a colder midplane, consistent with expectations from thermo-chemical disk models. Radial temperature gradients are also observed, reflecting stellar heating or external heating. These results demonstrate the potential of tomographic reconstruction, combined with high-quality ALMA observations from *DISKSTRAT*, to provide new constraints on the vertical thermal structure of protoplanetary disks and to inform models of disk evolution and planet formation.

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