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Unveiling the third dimension: vertical structure as a probe of planet formation conditions

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Propositions
accompanying the thesis

Unveiling the third dimension:
vertical structure as a probe of planet formation conditions

1. Vertical emission surfaces can be directly extracted for multiple molecules from ALMA observations of mid-inclination disks (*Chapters 2, 3 & 4*).
2. The disk thermal structure follows a radial and vertical gradient which can be empirically probed using optically thick tracers such as ^{12}CO and ^{13}CO (*Chapters 2, 3 & 4*).
3. CO isotopologues show a clear vertical layering, with ^{12}CO being the most vertically extended, followed by ^{13}CO and $\text{C}^{18}\text{O } J = 2 - 1$ (*Chapters 2 & 3*).
4. CN $3 - 2$ is an excellent tracer of turbulence in the upper disk region (*Chapter 4*).
5. The vertical location of the CO emitting surface for a protoplanetary disk can be used as a probe of the total disk mass and volatile carbon depletion.
6. Nature is complicated and a single model will never be able to account for all the observational details.
7. Scientific results must always be checked using different methods and by independent teams.
8. Visual assessment of the data should not be underestimated or initially disregarded in favor of fully automatic analysis.
9. Science communication is important to foster critical thinking and must be part of institutional policies rather than individual endeavours.
10. Scientific research is performed by humans and therefore is not politically neutral.
11. One should always have something sweet after lunch.
12. Long-distance relationships can end in happy marriages.

Teresa Paneque Carreño
Leiden, 13 September 2024