# Unveiling the physical and chemical conditions of the youngest disks: A warm embedded disk in L1527

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## **Typical protoplanetary disk**

E.g., TW Hya [1,2], HD 163296 [3], IM Lup [4], Flying Saucer disk [5].

# L1527 A young embedded disk





**CO ice** (T < 20 K)

Planet formation likely starts in young disks still embedded in their infalling

envelopes.

However, unlike the more evolved protoplanetary disks, **the physical and chemical structure of the youngest disks is still poorly constrained.** We examined the temperature structure of the Class 0/I disk L1527.

**CO gas** (T > 20 K)

### Get temperature from optically thick <sup>13</sup>CO emission:

the midplane temperature is > 25 K

<sup>13</sup>CO  $T_{mb}$  (K) **disk only disk and inner envelope** 

**Extrapolate measured temperature:** the entire disk is likely warmer than 20 K

disk

envelope

disk radius disk radius



**References:** [1] Qi, C., Öberg, K.I., Wilner, D.J., et al. 2013, Science, 341, 630; [2] Schwarz, K.R., Bergin, E.A., Cleeves, L.I., et al. 2015, ApJ, 813, 128; [4] Pinte, C., Menard, F., Duchene, G., et al. 2018, A&A, 609, A47; [5] Dutrey, A., Guilloteau, S., Piétu, V., et al. 2017, ApJ, 849, 56; van 't Hoff, M.L.R., Tobin, J.J., Hartsono, D., & van Dishoeck, E.F., submitted to A&A.