# How much dust is available for planet formation?

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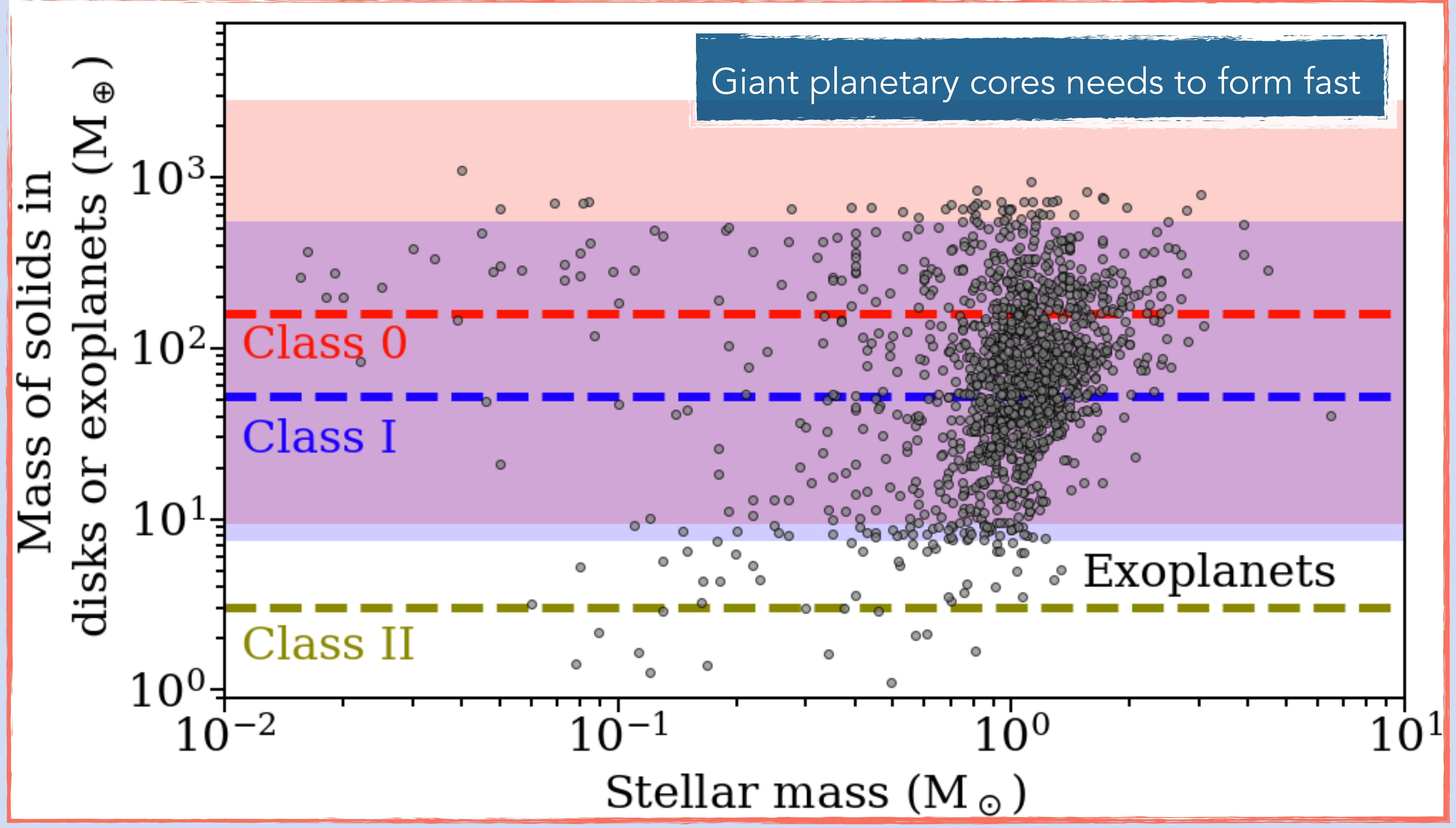
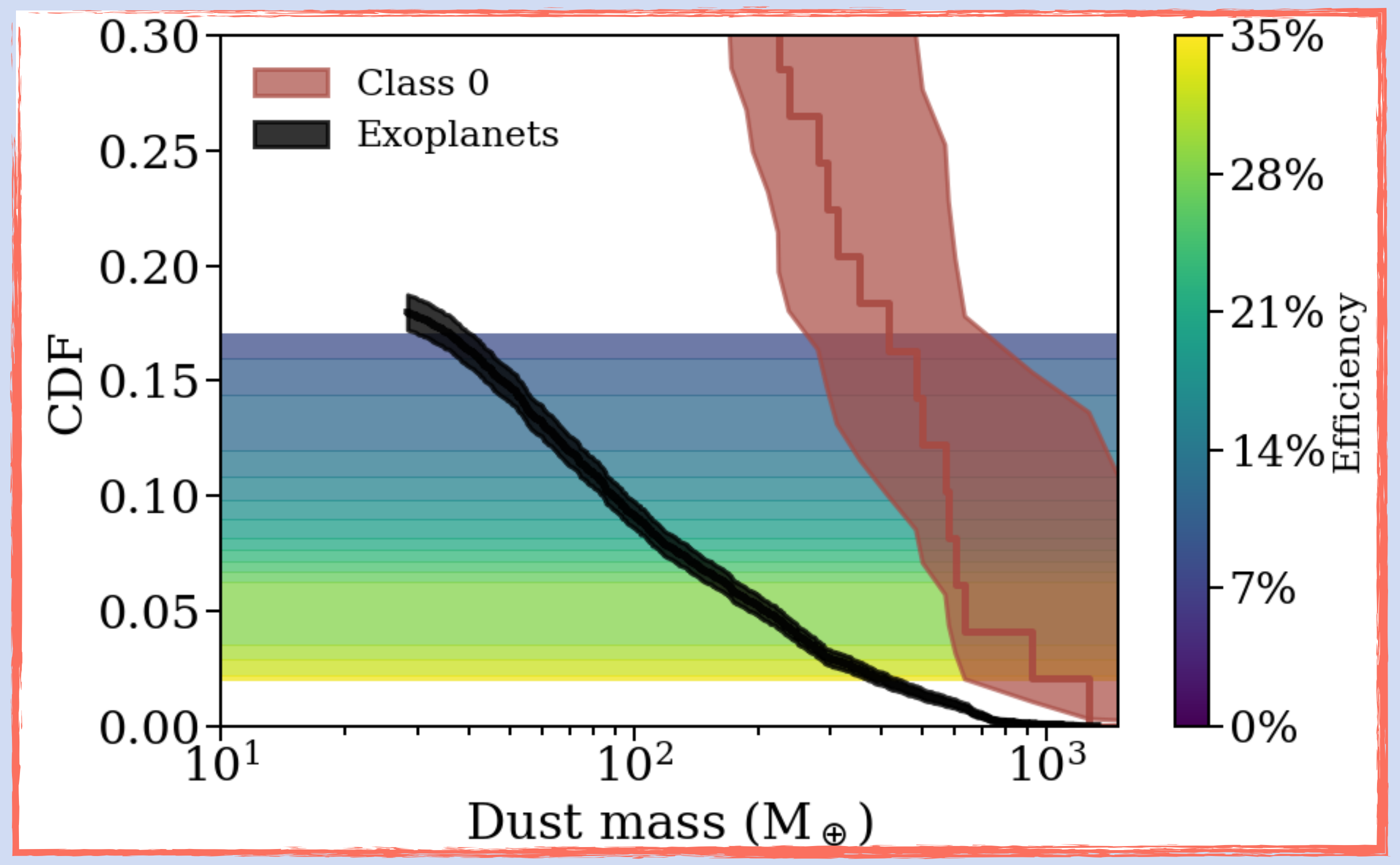
paper: https://arxiv.org/pdf/2006.02812.pdf

- Data from VLA (9 mm) and ALMA (1 mm) in Perseus provide estimate spectral index.
- VLA data corrected for free-free emission provide optically thin dust flux
- Class II data from ALMA survey in Lupus (Ansdell et al. 2016)




## Key findings:

- Median disk dust masses: ~160 (Class 0) and 50 Earths (Class I)
- Class 0/I disks have enough dust mass to make observed gas giants
- The ~15% efficiency of planet formation from Class 0 disks is consistent with pebble accretion

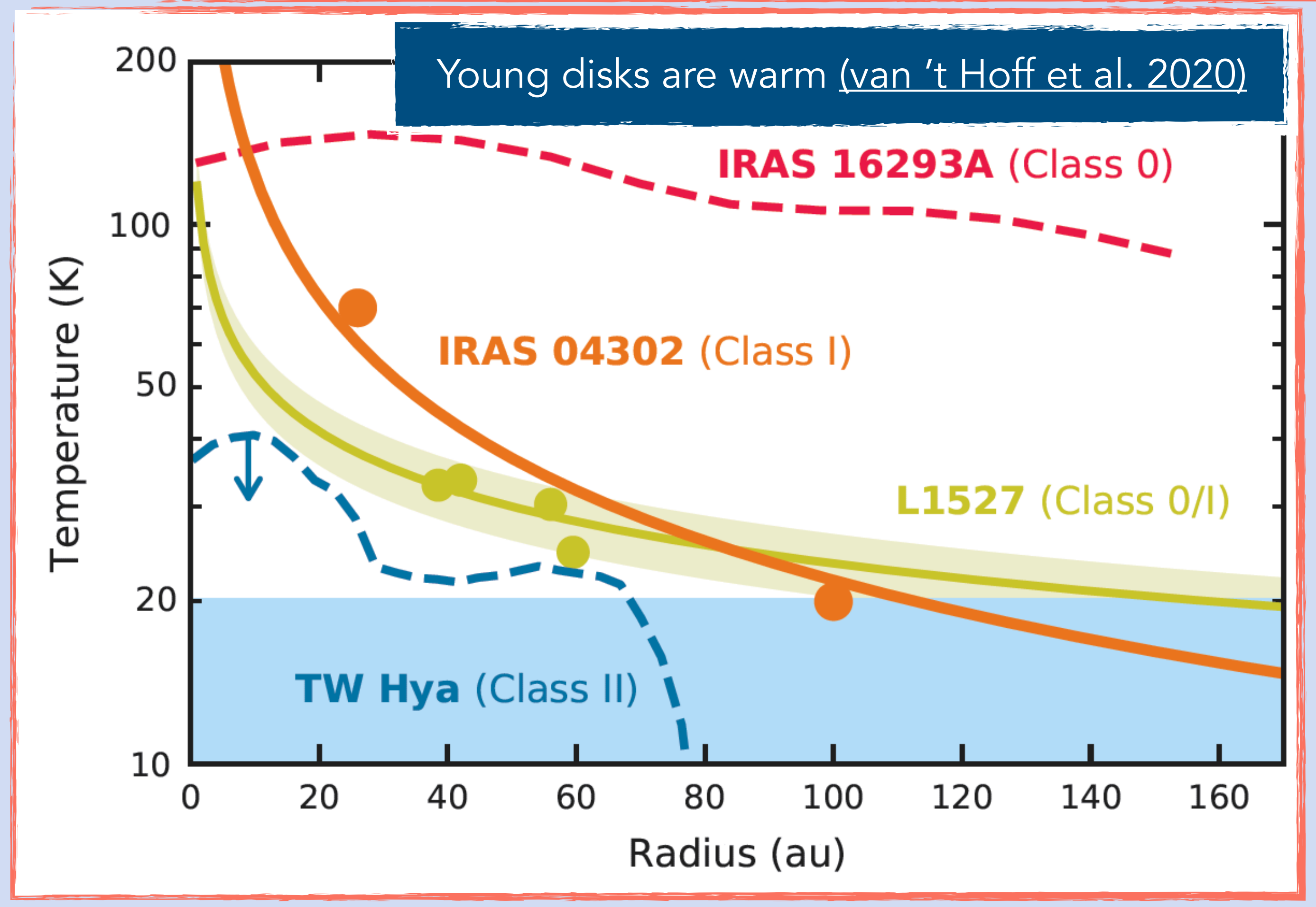



Only by Class 0 (~$10^5$ yrs) efficiencies are acceptable by pebble accretion models ~15% (Ormel et al. 2017)

**Warning:**

- Binary systems have higher efficiency predicted (Bitsch et al. 2019).
- Disks still accrete mass in Class 0/I

**Implications:** planet formation begins in very young disks




**Conditions at Class 0:**

- warm disk up to a large radii
- Important snowlines (CO, $N_2$) shifted

**Problems for planet formation:**

- High temperatures do not facilitate collapse
- Snowlines are expected to trigger pebble growth
- Fast formation can lead to a fast migration of the planet?

Data: VLA - VANDAM Survey (Tobin et al. 2016); ALMA - 2017.1.01693.S, PI: T. Hsieh (Hsieh et al. 2019); 2017.1.01078.S, PI: D. Segura-Cox; 2013.1.00031.S, PI: J. Tobin (Tobin et al. 2018)

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