

The Unusual Debris System Surrounding the Sun-like Star HD 12039

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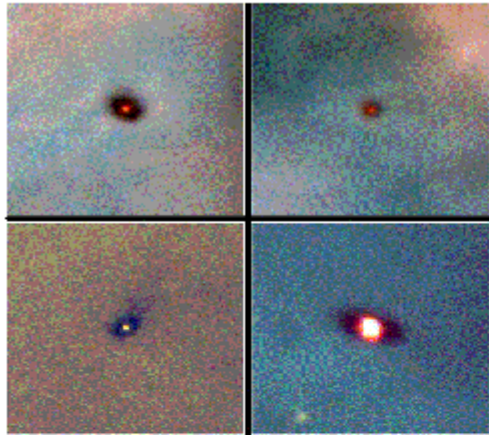


F.E.P.S.

Formation & Evolution of Planetary Systems

From Active Accretion to Planetary Debris Disks...

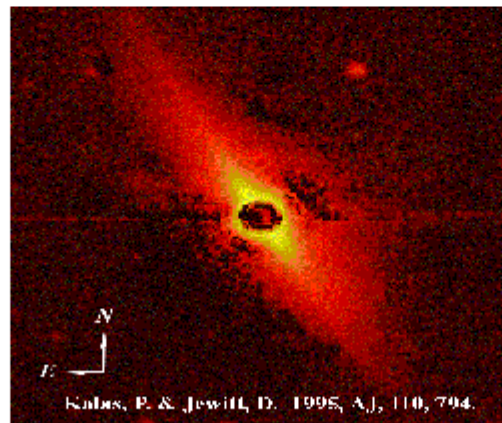
Images courtesy of M. McCaughrean, C.R. O'Dell, NASA, and P. Kalas.



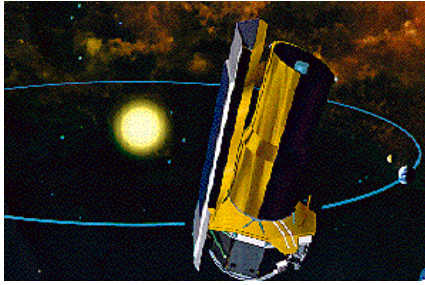
Orion Disks 1 Myrs



Zodiacal Dust 5 Gyrs



β Pic 20 Myrs

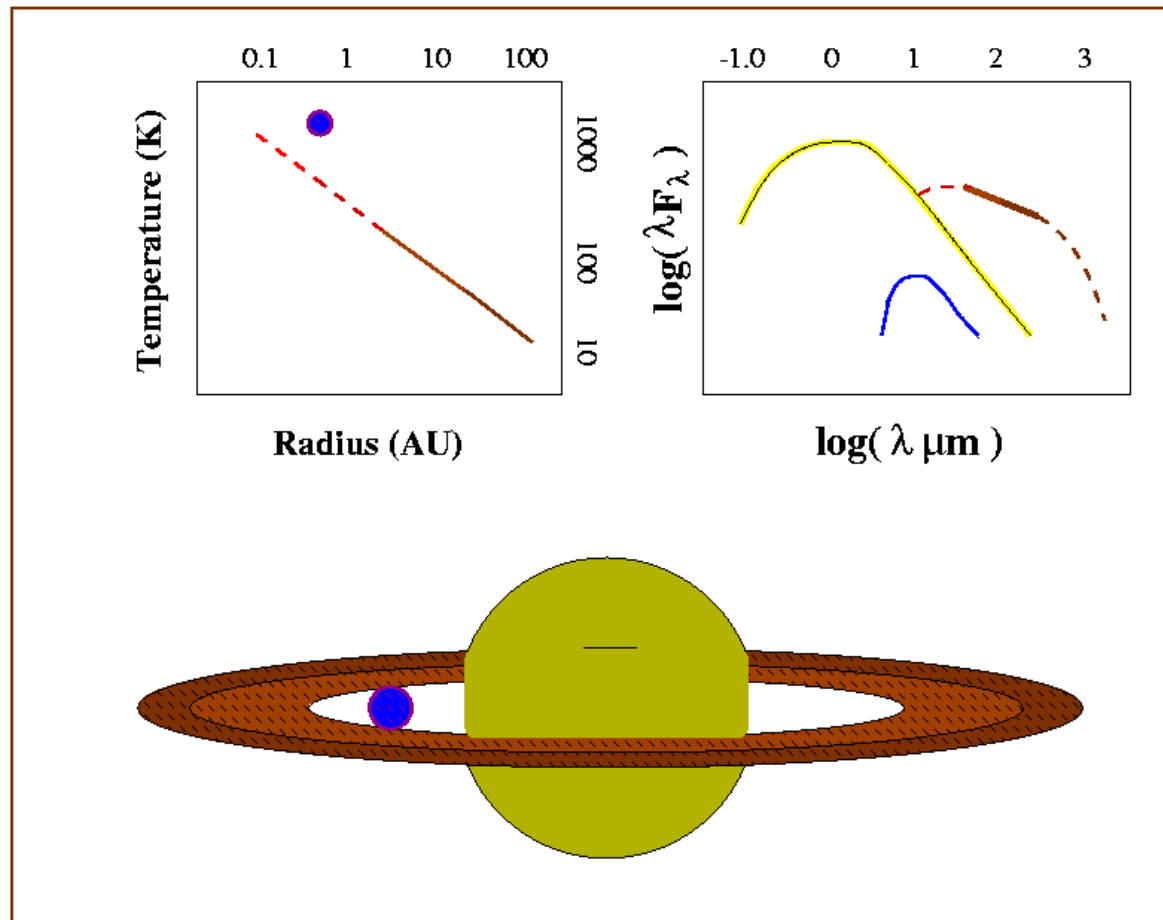


Spitzer Legacy Science: The Formation and Evolution of Planetary Systems

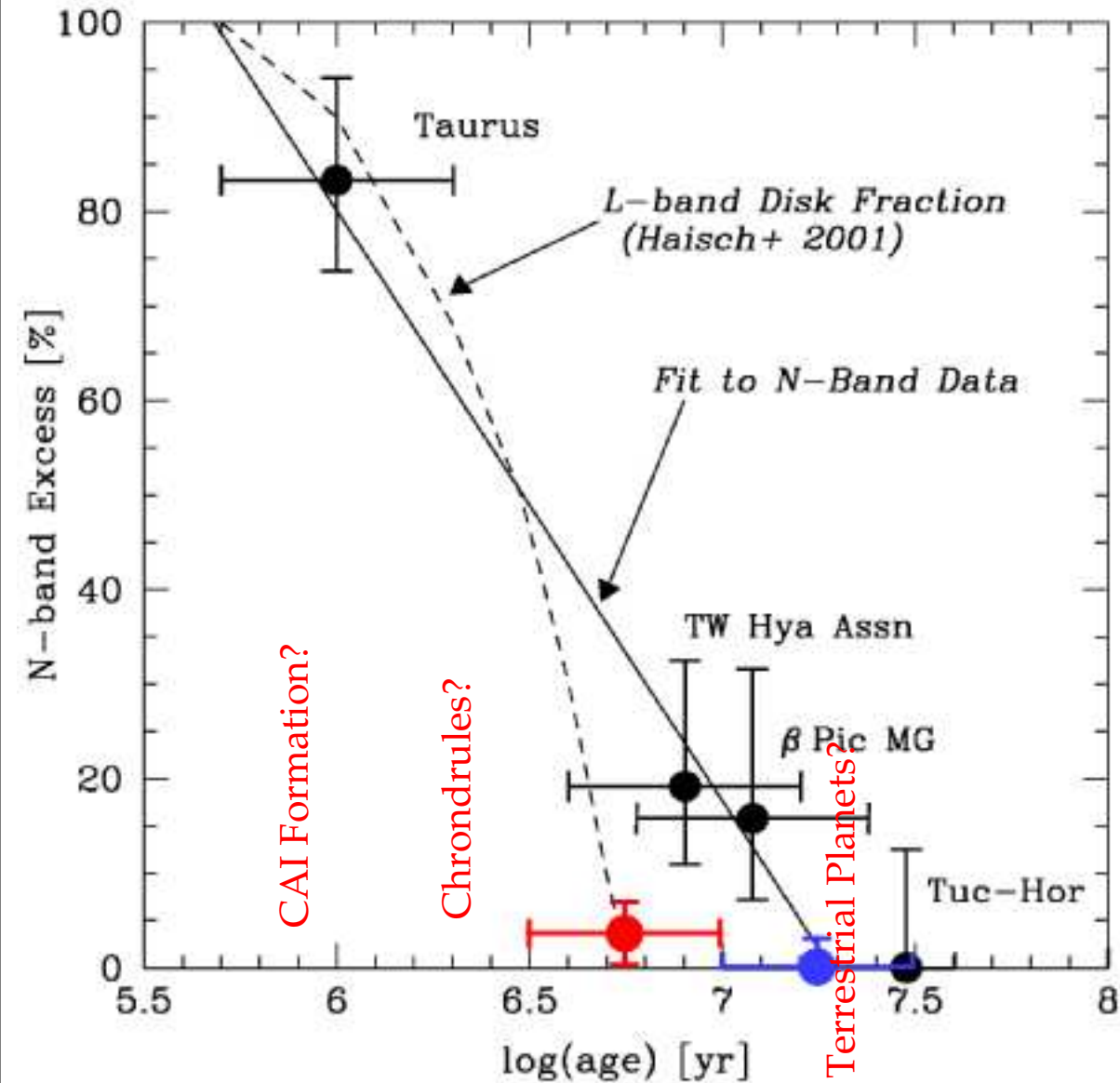
- Formation of Planetary Embryos:
 - » Characterize transition from **primordial to debris** disks.
- Growth of Gas Giant Planets:
 - » Constrain timescale of **gas disk dissipation**.
- Mature Solar System Evolution:
 - » examine the **diversity of planetary systems**.

Is our solar system common or rare?

Blackbody Disk with Dynamically Cleared Gap



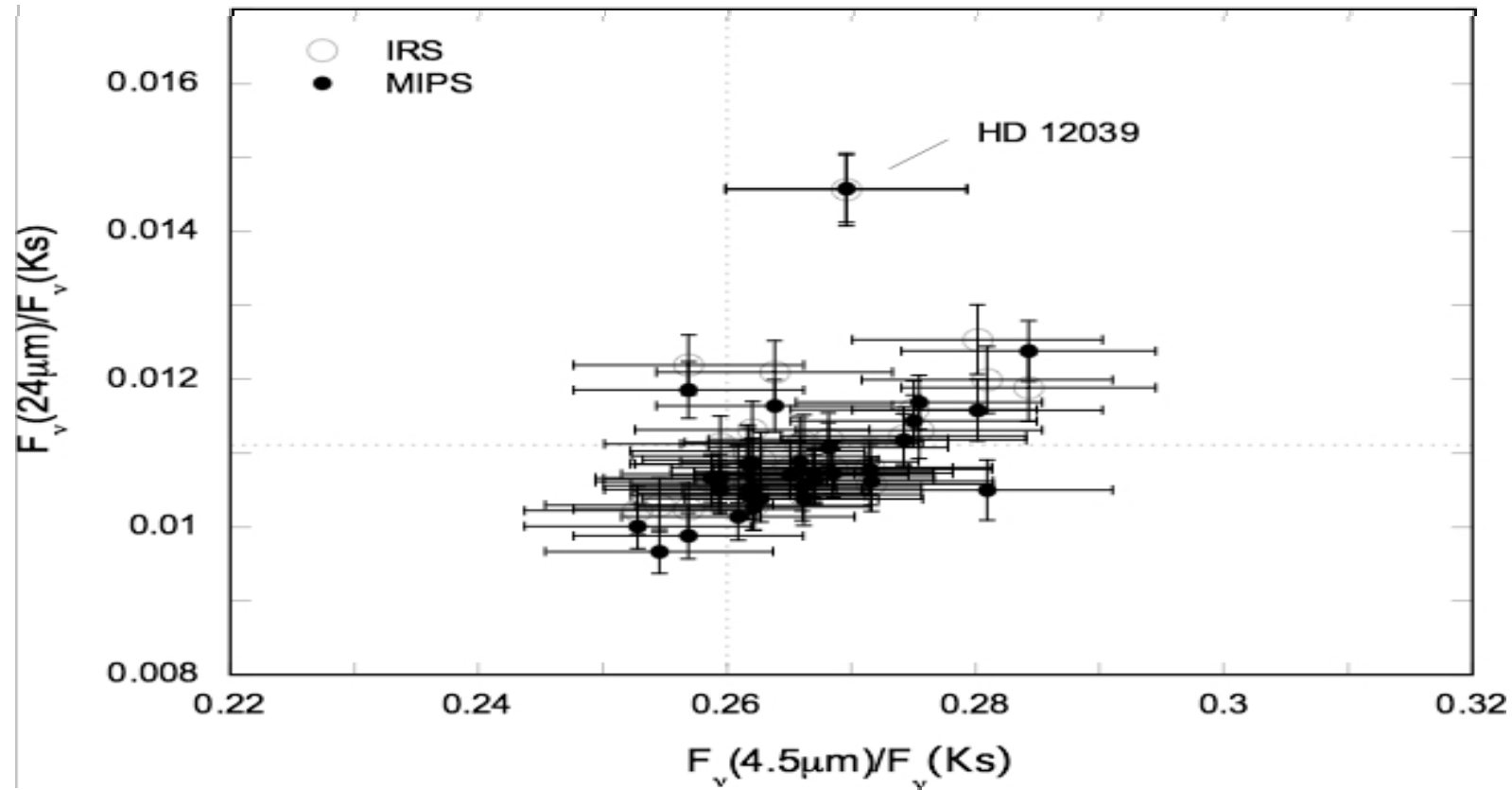
MIR Excess Fraction (0.3-1.0 AU) vs. Cluster Age



Silverstone et al.
(ApJ, resubmitted)

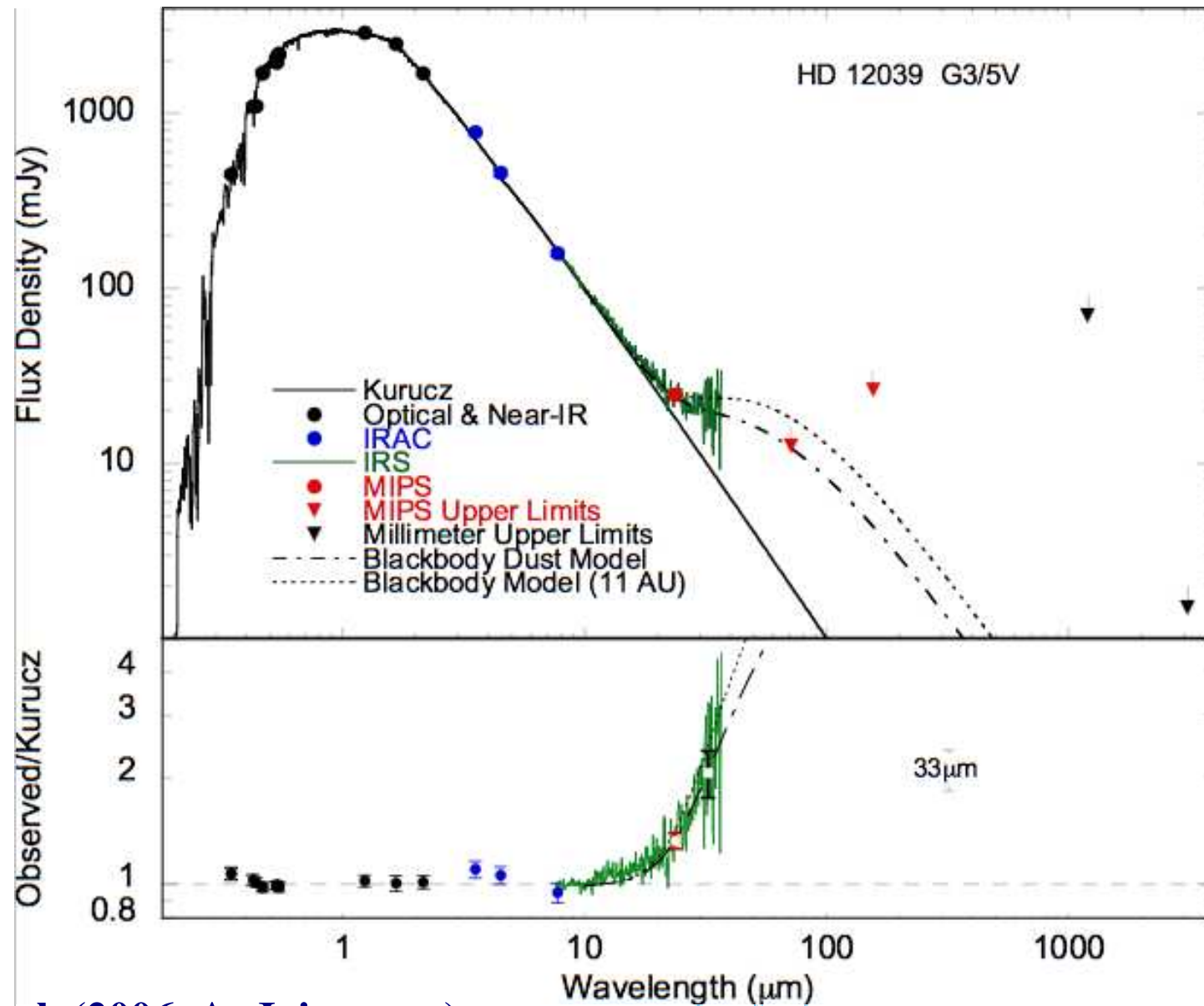
3-10 Myr old IRAC.
10-30 Myr old IRAC.

Spitzer IRS/MIPS Reveals "Needle" in FEPS Haystack



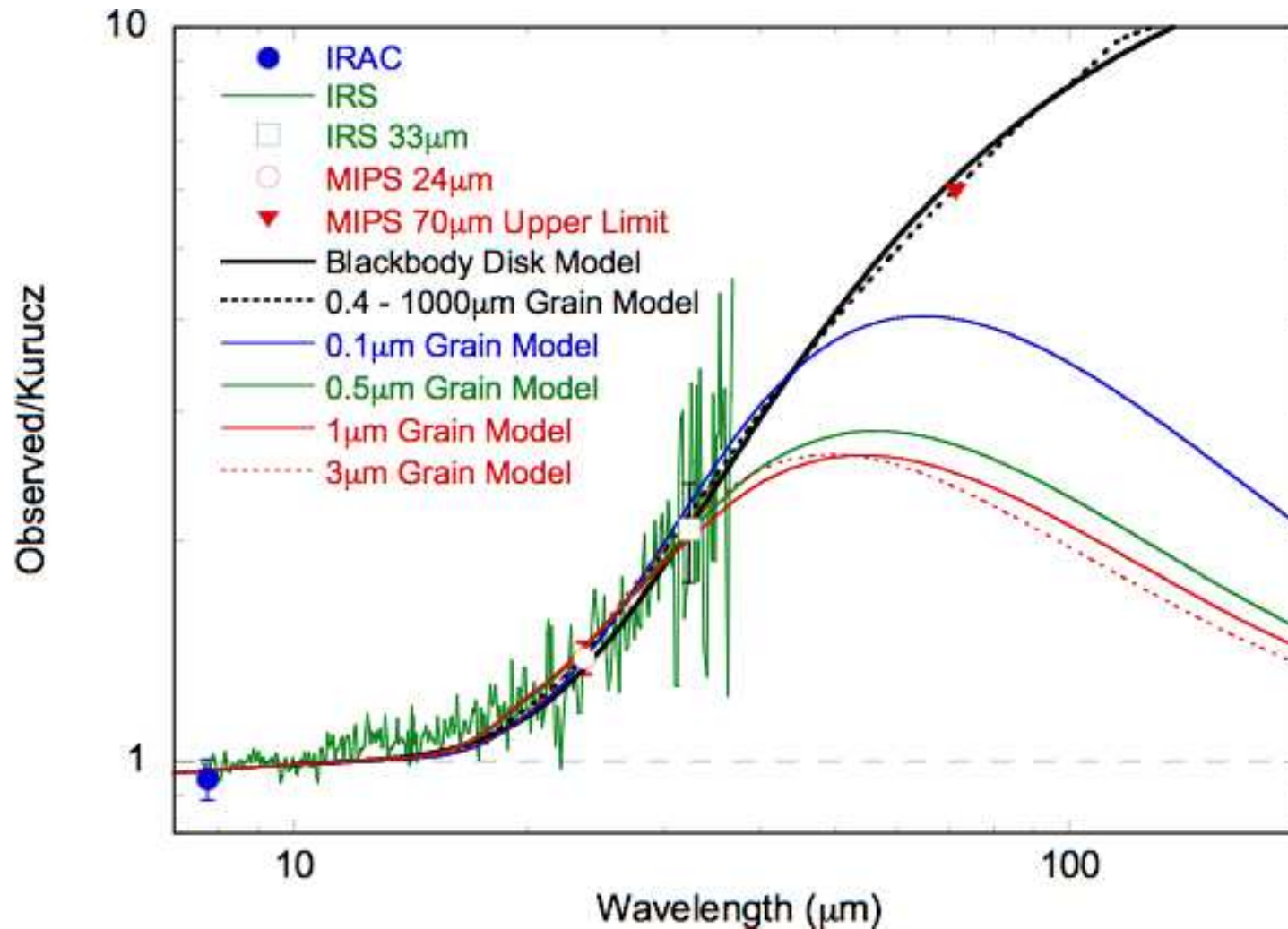
Hines et al. (2006, ApJ, in press)

HD 12039 IR Excess: Temperature ~ 110 K – warm!



Hines et al. (2006, ApJ, in press)

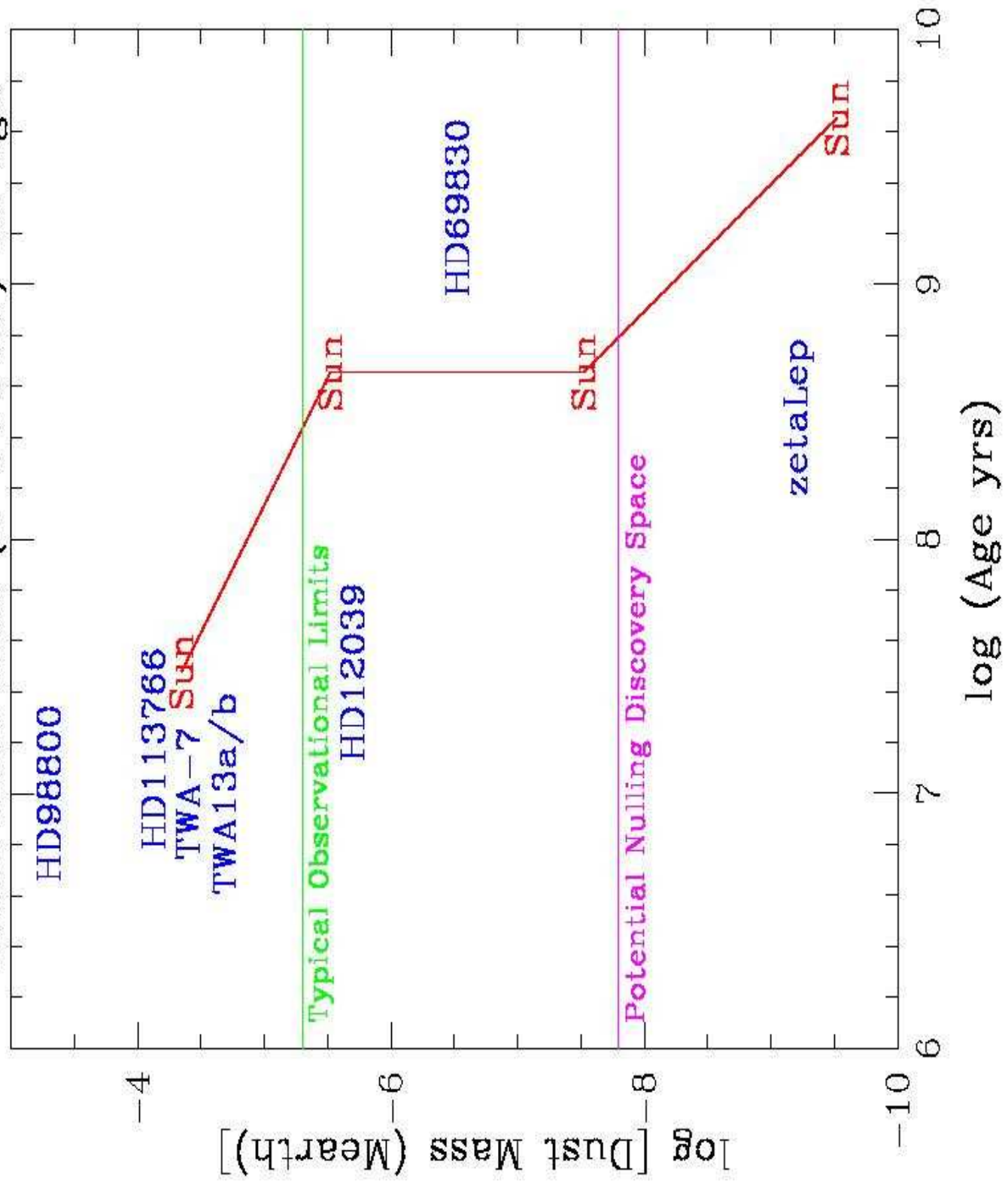
HD 12039 IR Excess: Large Grain Model Preferred.



Warm debris belt 4-6 AU around 30 Myr old sun-like star!

Hines et al. (2006, ApJ, in press)

Warm Dust Mass ($R < 10$ AU) vs. Age



HD 12039: The Executive Summary

- Narrow range of temperatures $T \sim 110$ K.
- **Warm debris 4-6 AU** suggested by large grain model [*small grains > 30 AU still possible*].
- **Mass inferred lower than solar system** at comparable epochs.
- **Massive inner debris belts rare**, but more common at ages < 100 Myr!

<http://feps.as.arizona.edu>