From Star Formation to Exoplanets: How did we get here?

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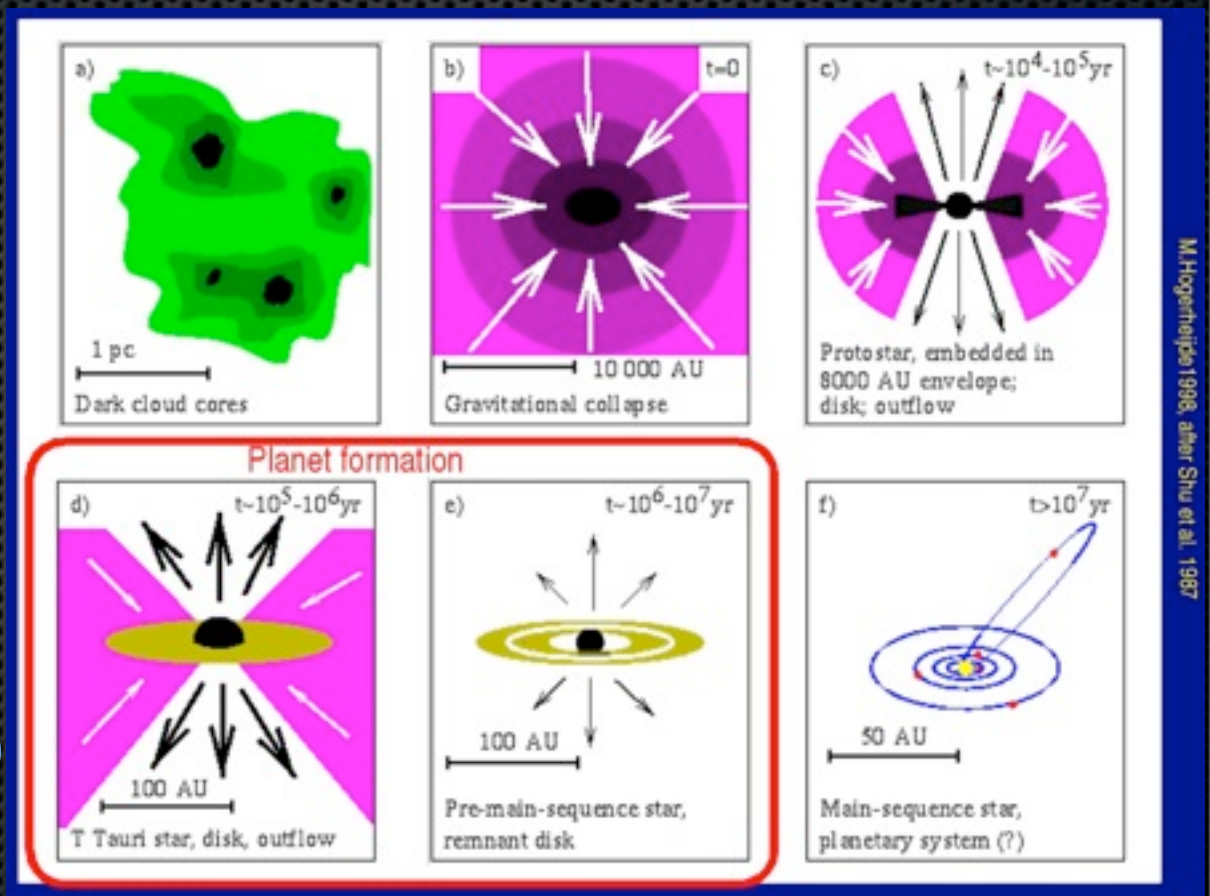
Andrew Youdin (CfA)

Chris Matzner (Univ. Toronto)

Mark Krumholz (UCSC)

Richard Klein (LLNL/UCB)



Hogerheijde, 1998 from Shu et al 1987

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F. Rasio + SOC

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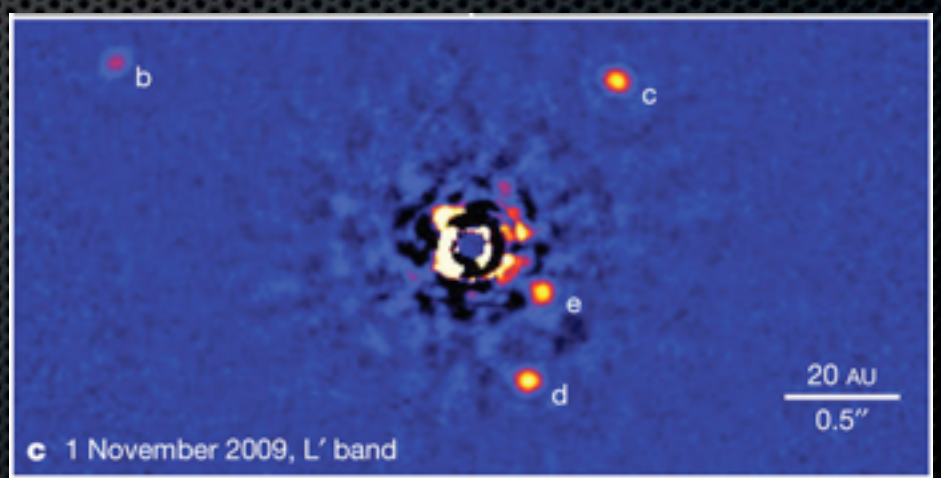

Marois et al 2010

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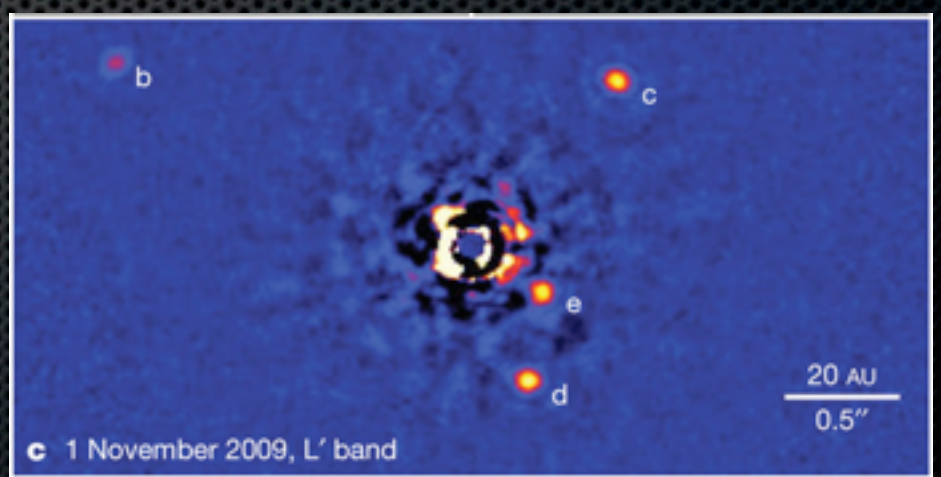
F. Rasio + SOC

Star formation



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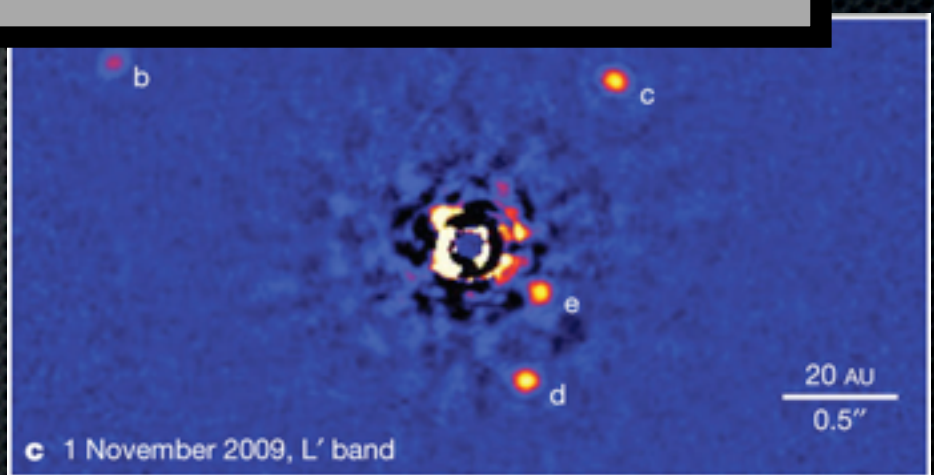
Star formation = Infall, Irradiation



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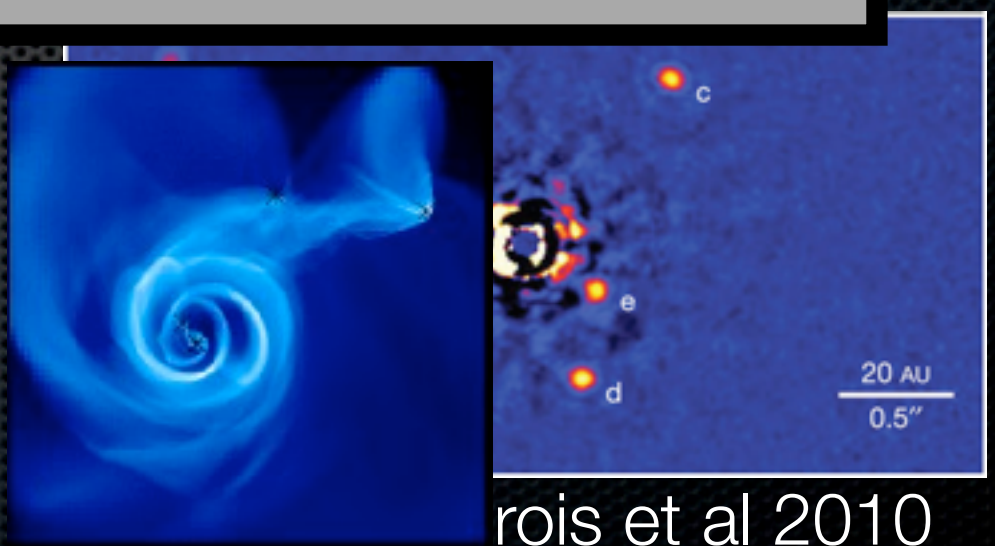

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The two key questions for GI depend on infall and irradiation:

1. **Does the disk fragment?**

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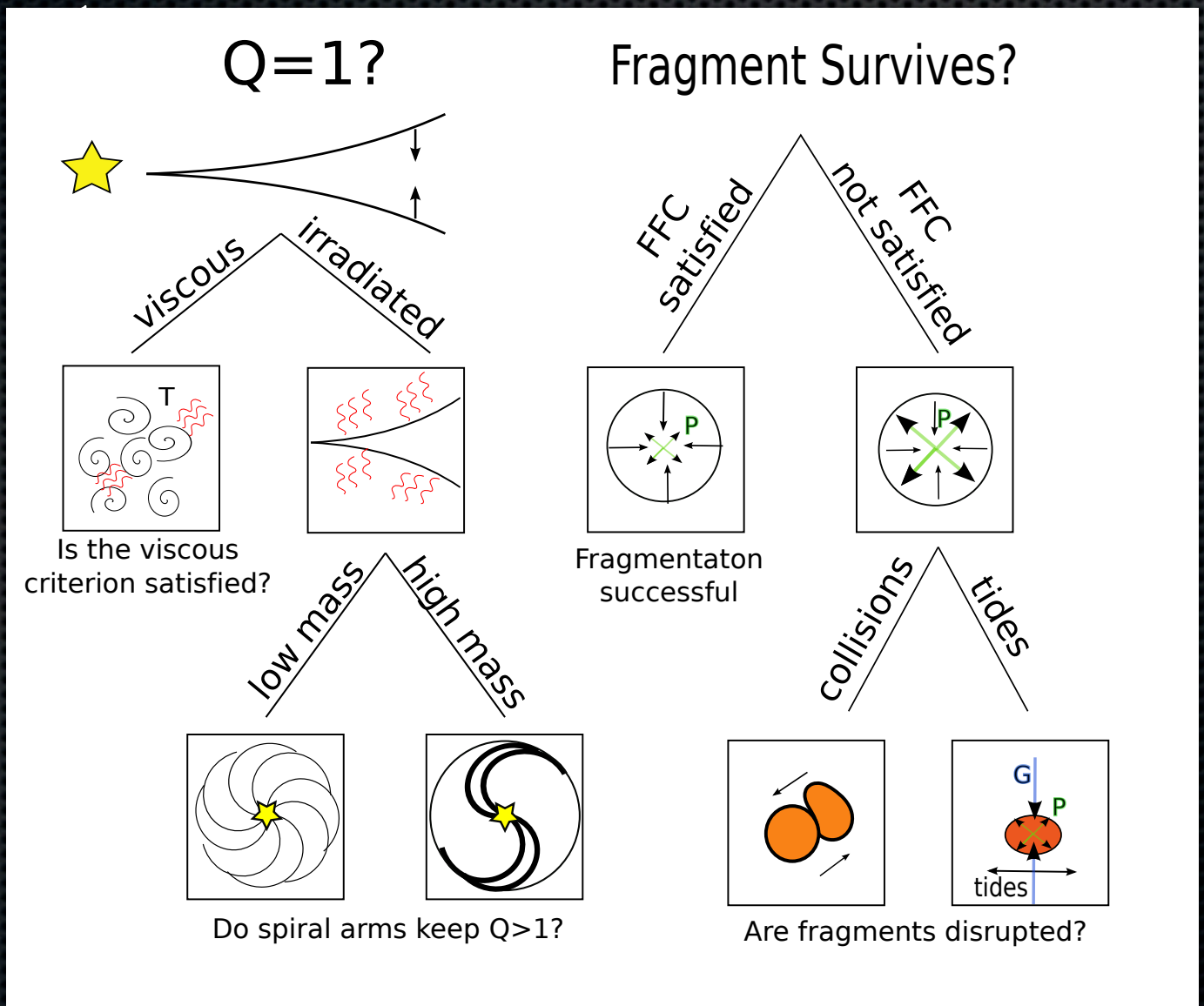
Thermodynamics and infall control gravitational instability

Kratter & Murray-Clay, 2011

$$Q = \frac{c_s \Omega}{\pi G \Sigma}$$



See also Rice et al 2011

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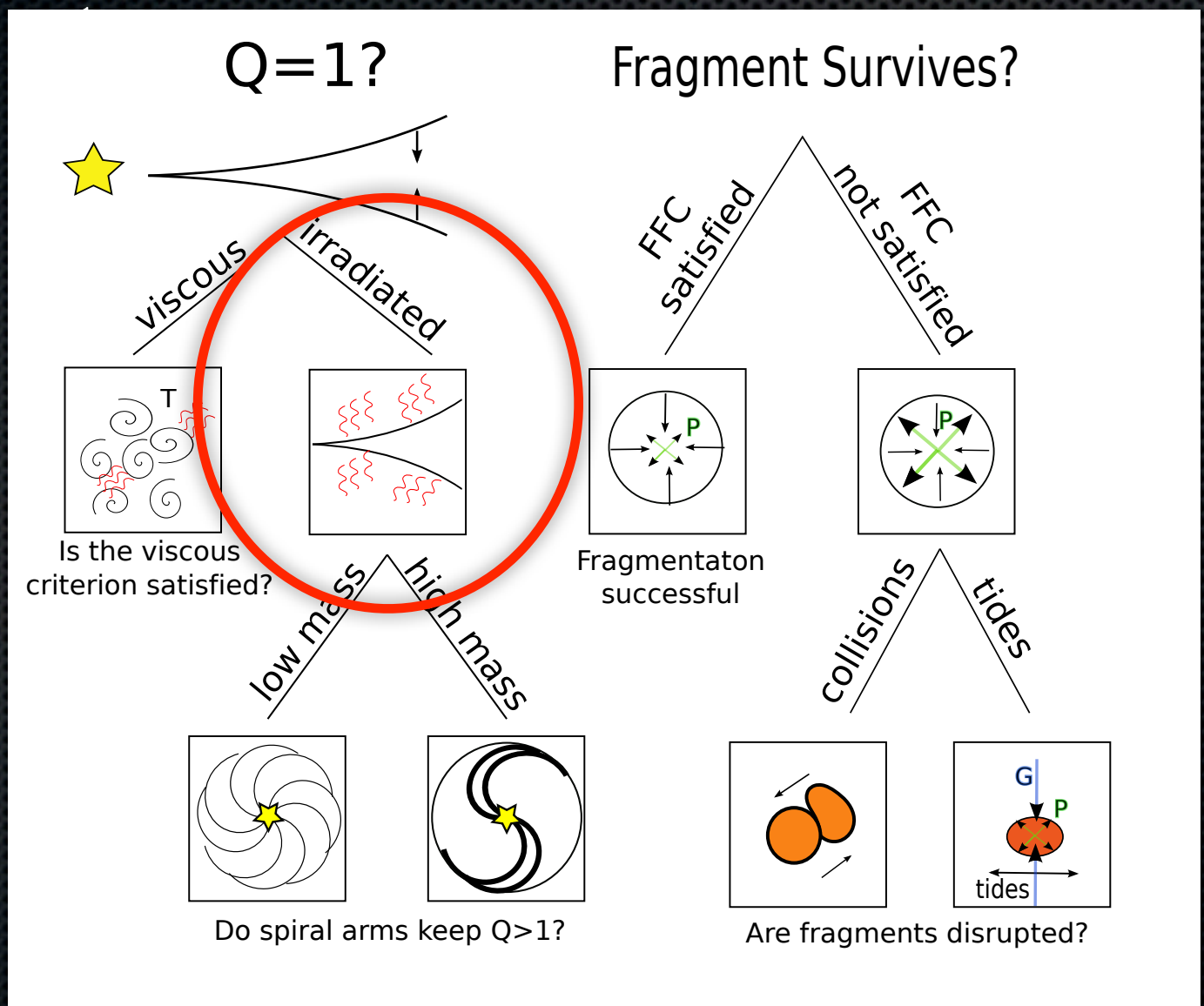

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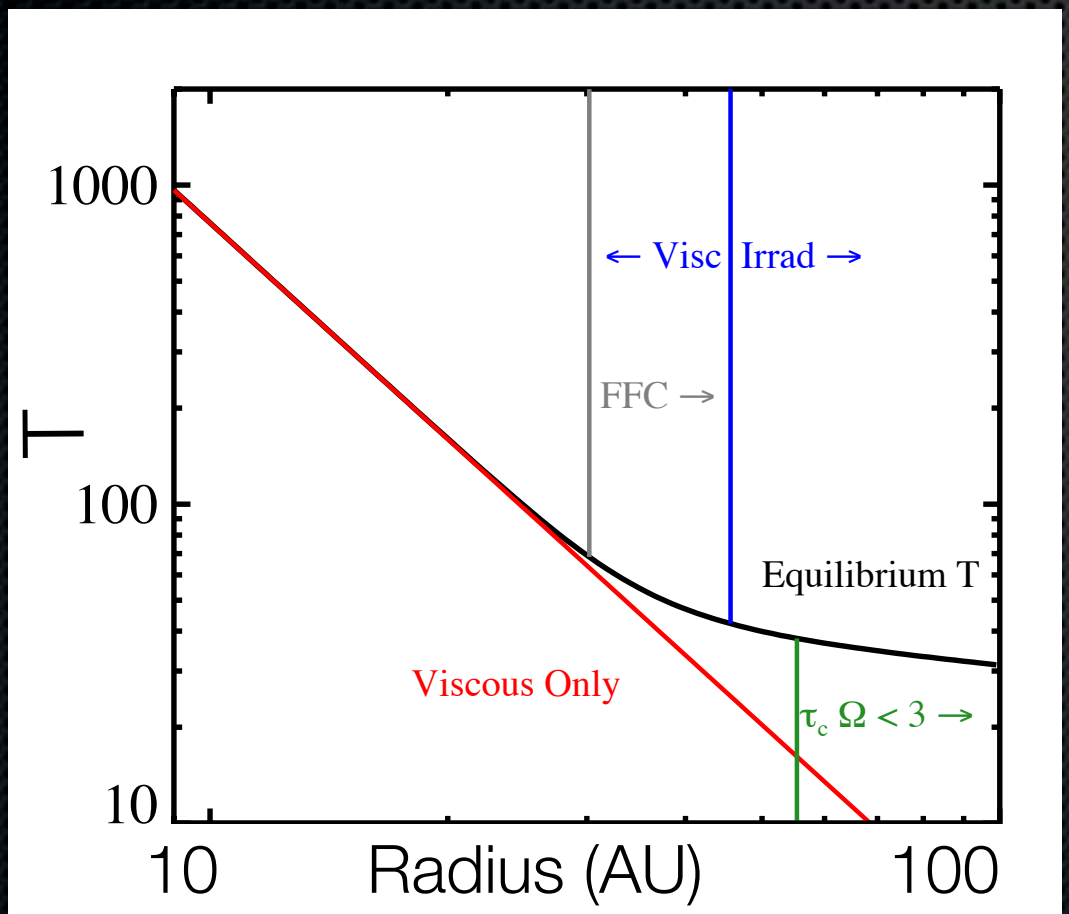
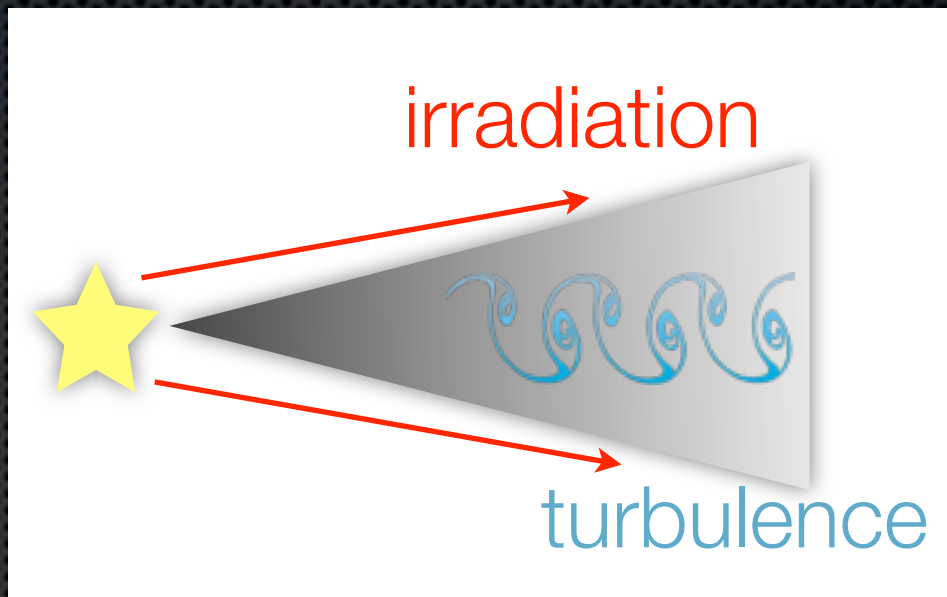
What is an "irradiation dominated" disk?





- Background / stellar radiation is more important than dissipation of turbulence

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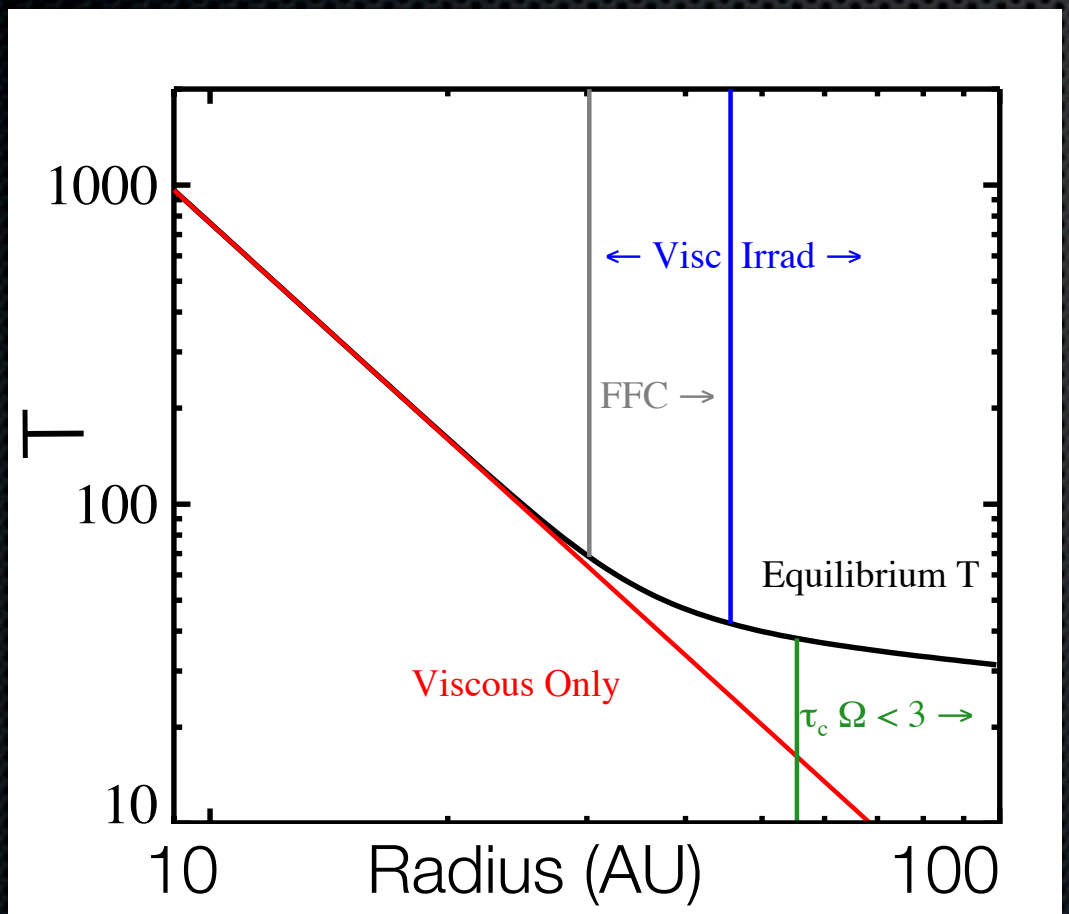

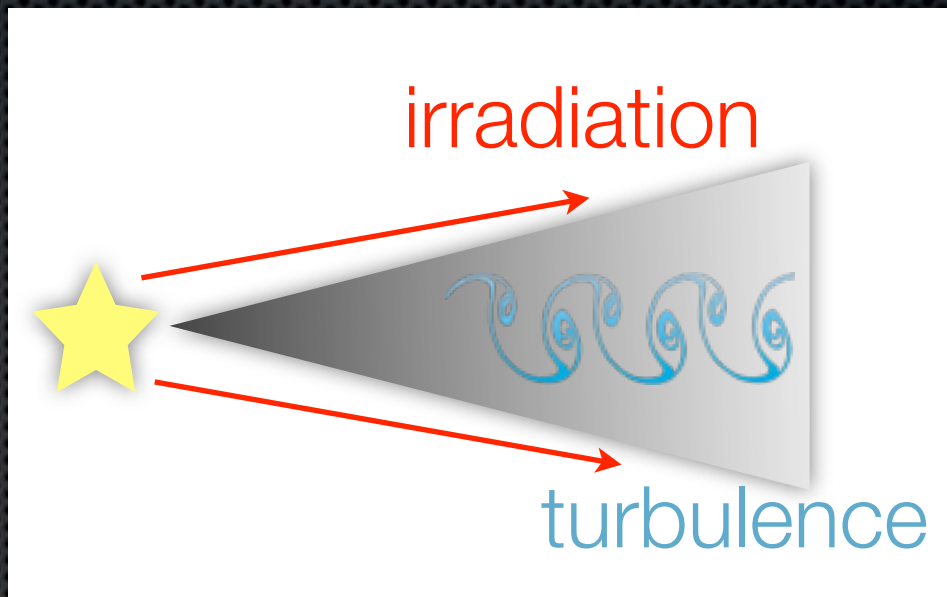

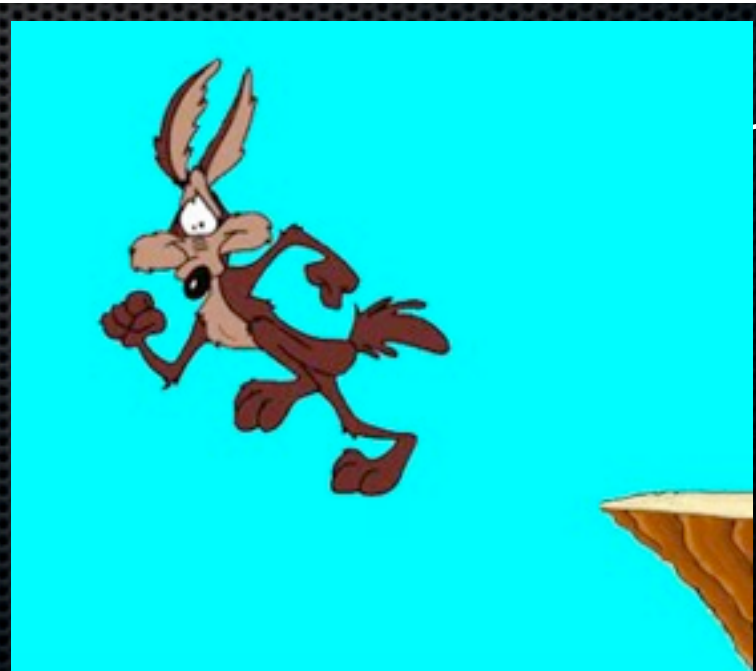

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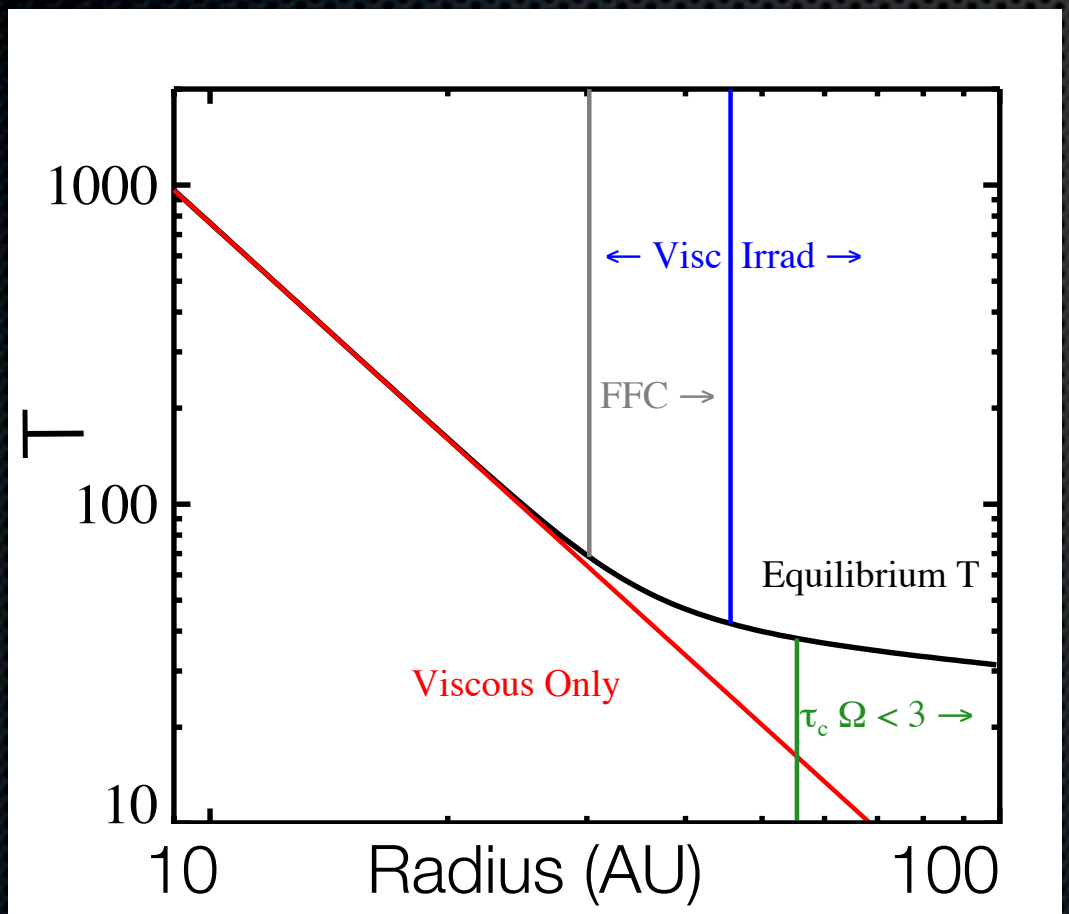

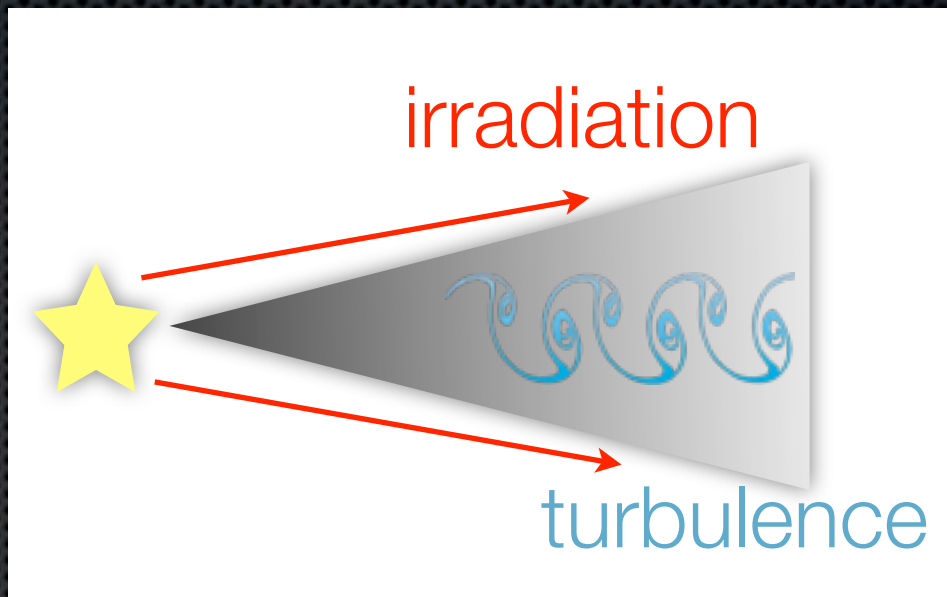

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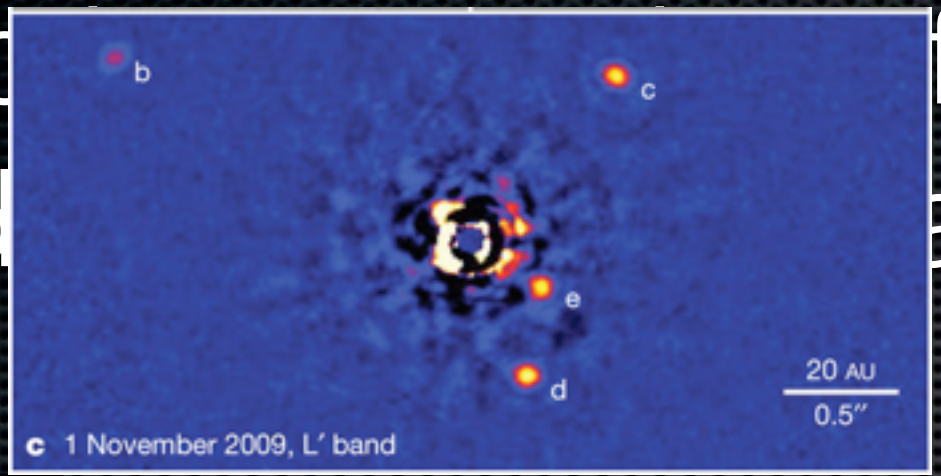
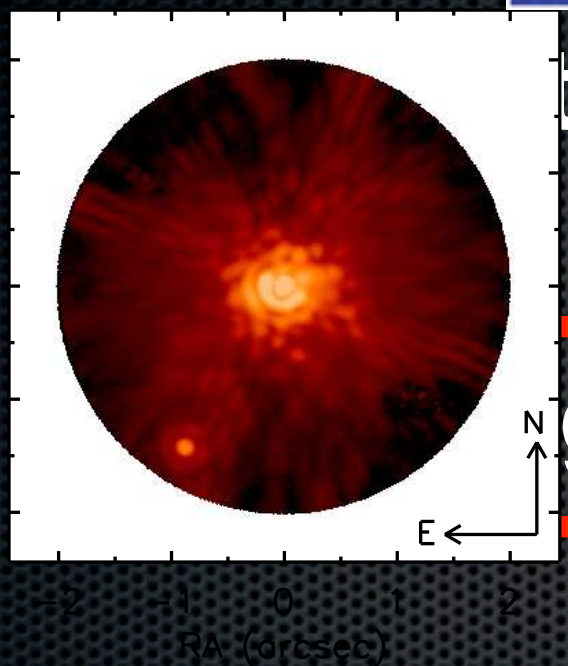
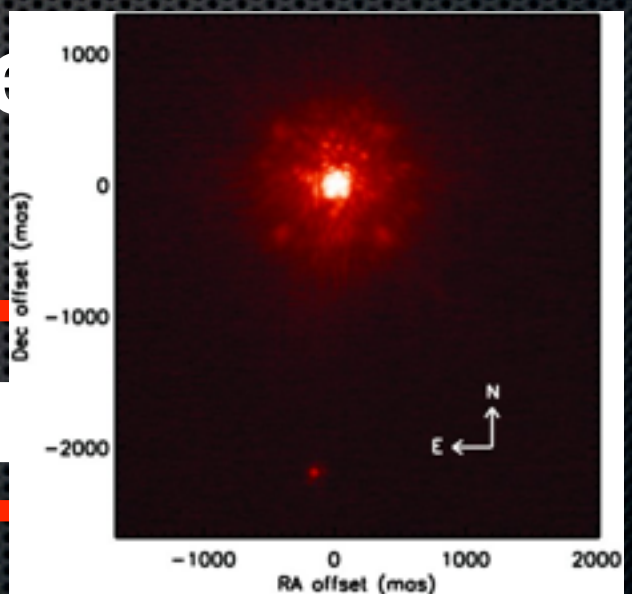


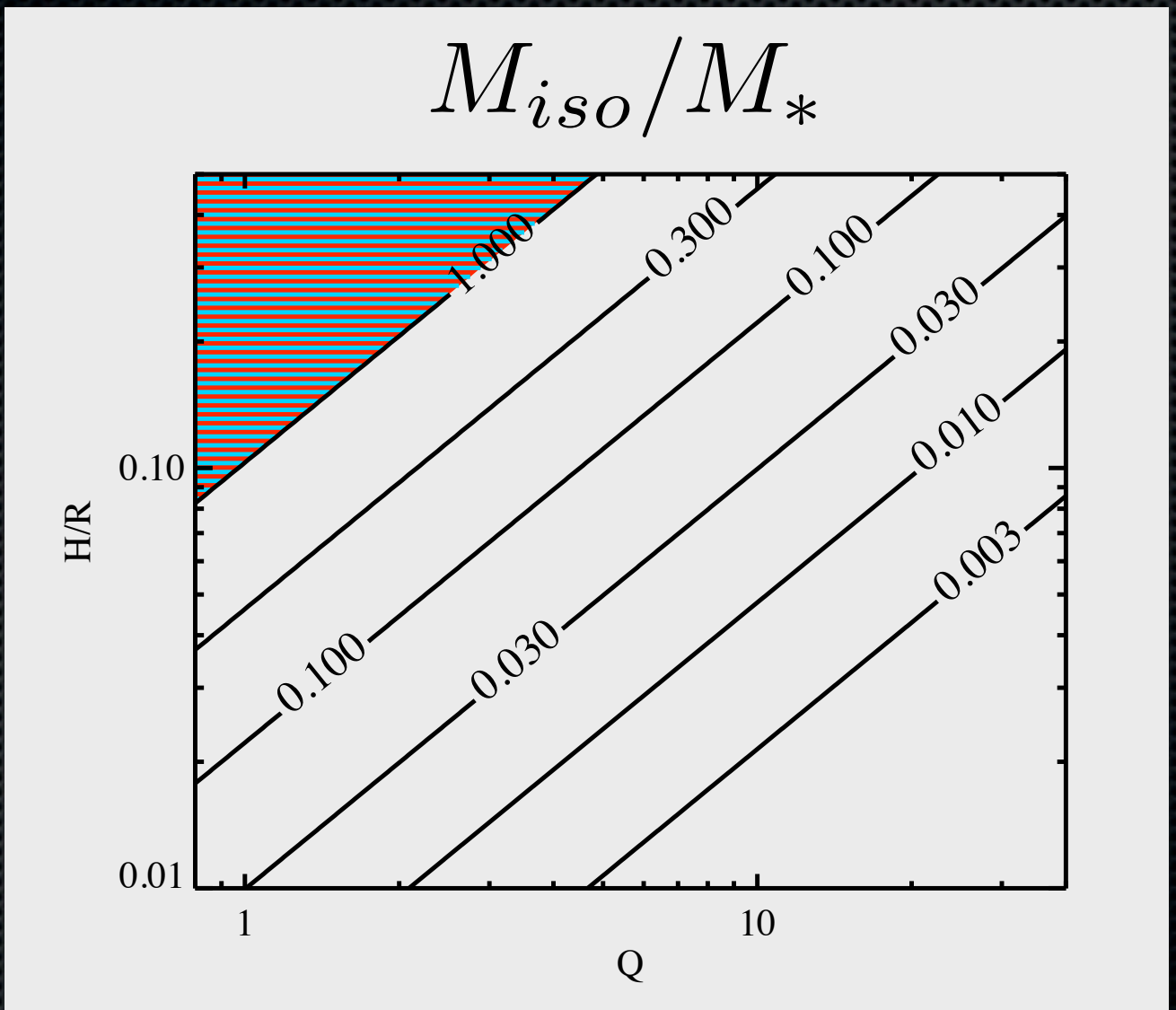




What distinguishes extreme ***stellar*** systems from extreme ***solar*** systems?

Hinkley + 10, Marois+ 10,Lafrieniere +11, Janson+11, Ireland+11

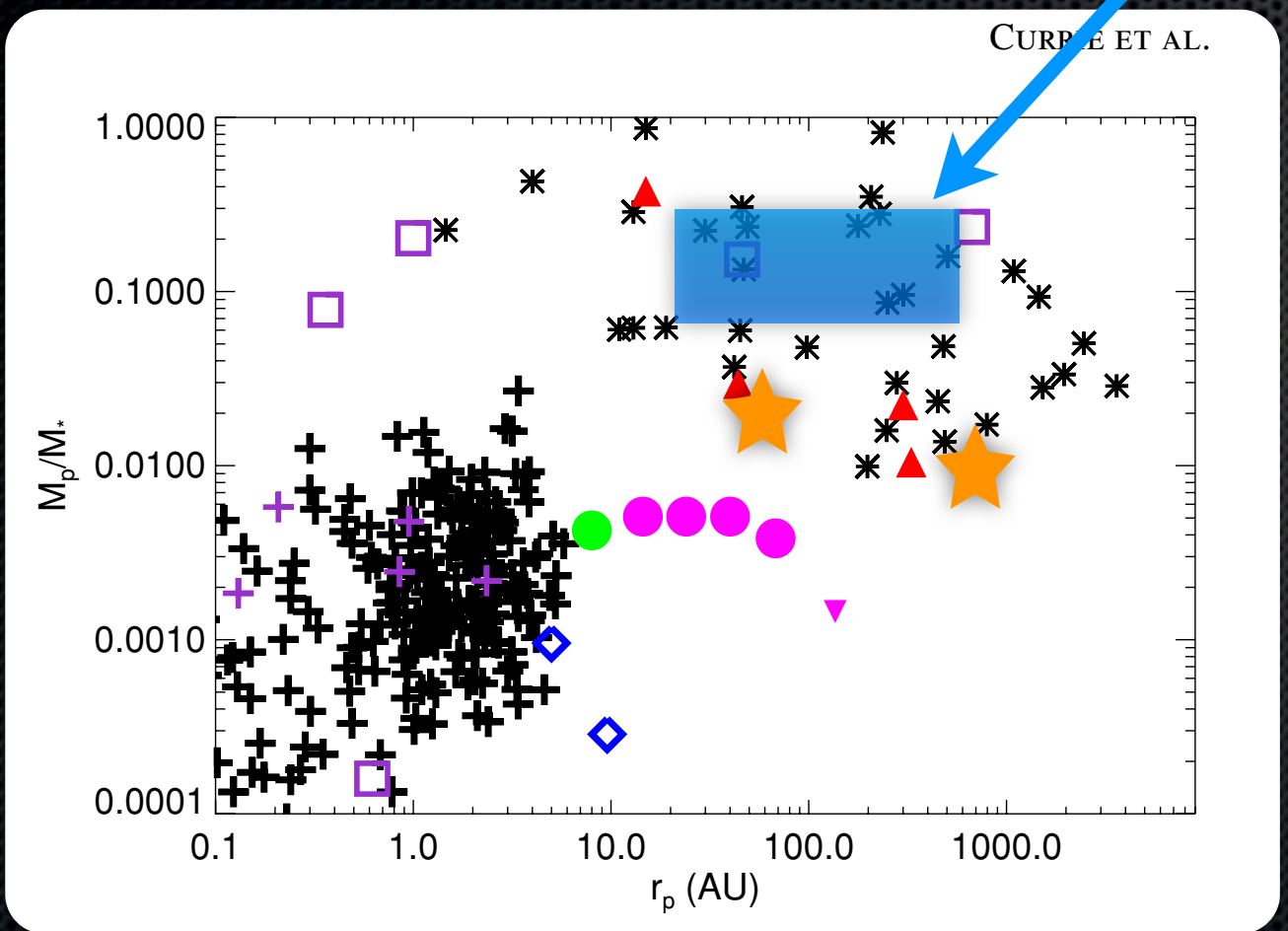
Fragments like to grow!



Kratter et al, 2008, 2010, Kratter, Murray-Clay & Youdin, 2010

GI predicts a population of **more massive** objects

Recent work + posters (A. Vigan) at this meeting



Currie et al, 2011,
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- Brown dwarf and massive planet **Desert** is real (Nielsen & Close 2009, Lafreniere et al 2007, Quanz et al 2011)
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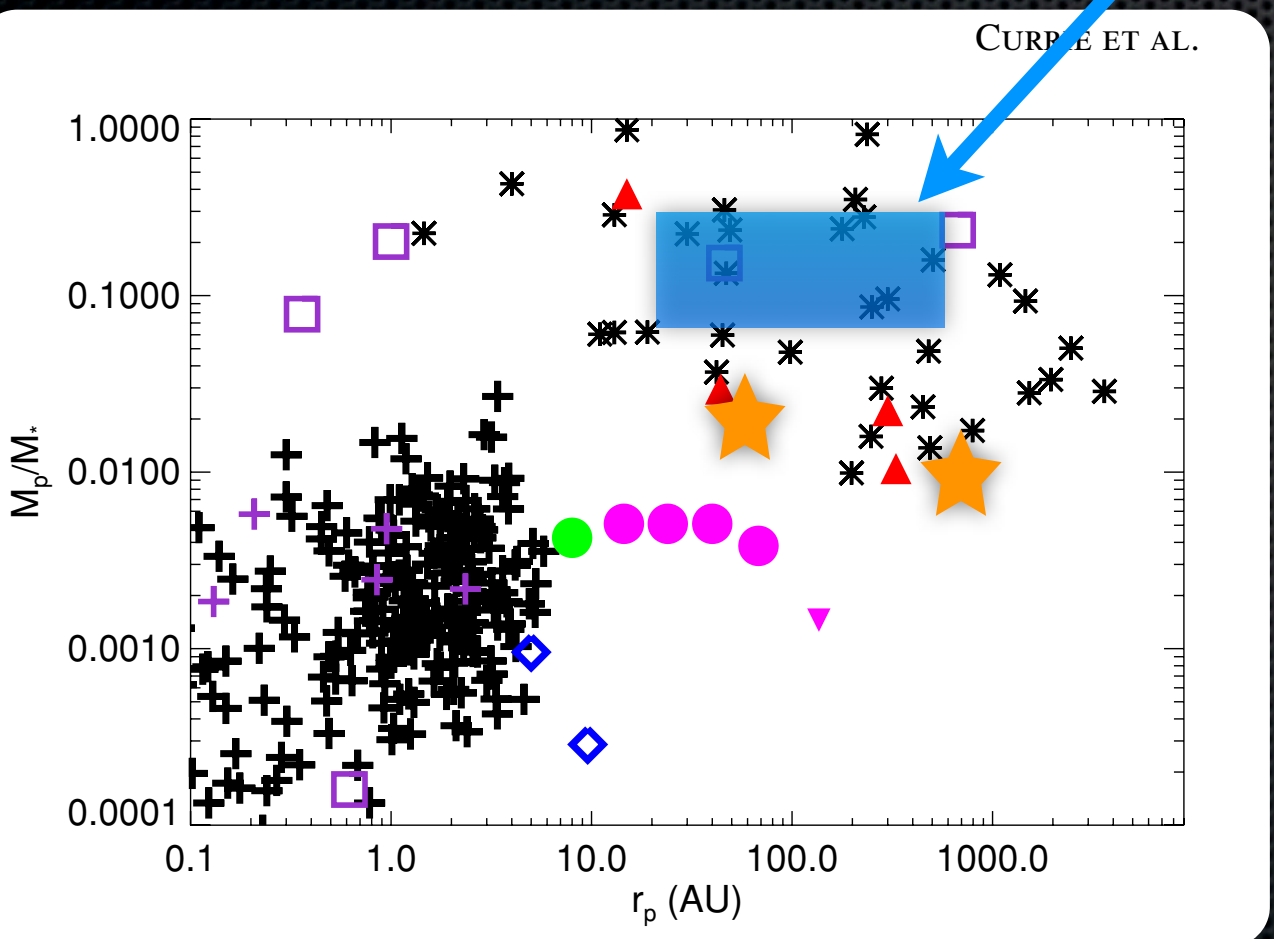

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