

## Questions and Answers

The Formation of Stars and Planetary Systems, 2010, September 6-9, Särö, Sweden

Section & Talk by M. Wyatt

Name/Question A. Roberge

How does the statement that the planets + planetesimal belts are ~~set~~ set at the end of the protoplanetary disk phase jive with planets on wide orbits (e.g. Fomalhaut b) ?

Name/Answer M. Wyatt

Suggest that dynamical scattering of planet occurred very early, before debris disk phase.

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Name/Question Sarah Maddison

- Nice model resonant crossing is gas free right? So "final system" (planets + planetimals) not fixed at end of PPD phase.
- So depending on planet configuration, secular evolution timescales different - so couldn't you get (potentially) a LHB spike at any time?

Name/Answer Mark Wyatt

Different planetary configurations can potentially get a spike at any time. However, in practice the short orbital times mean that systems tend to go unstable very quickly  $\ll 10$  Myr, and fine-tuning is required to get a spike at "any" late time. Thus it is likely that the "final" system is reached quickly after the end of the PPD phase. The fact that disk fraction does not decrease significantly with age for main sequence F&K stars suggests that late Nice-model-like instabilities are rare (Booth et al. 2009).

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Name/Question Hannah Lang-Condell

(PD)  
You noted that protoplanetary disks and debris disks<sup>(DD)</sup> have similar dust masses when you include larger bodies ( $\sim 1$  km).  
But PDs have 100:1 gas:dust ratios (assumed) while DDs have nearly no gas at all.  
Have we observed any true intermediate disks?  
~~that~~ I.e. a gas-poor PD  $\sim$  gas-rich DD?

Name/Answer .....

A. CARMONA: There are a few cases, but the objects are not numerous.  
We may have an example in Collins et al. (2009):  
the star HD 100453. That may be an example of the link  
between a gas-rich protoplanetary disk and a Gas poor Debris Disk

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Section & Talk by ..... Mark Wyatt

Name/Question ..... Brende Matthews

Can the high  $e$  planetesimal belt you describe for  $\gamma$  Cori be fully established before gas dissipates from the PPD? Wouldn't gas act to circularize orbits?

Name/Answer ..... Mark Wyatt

Yes, if the planetesimals are large enough, say  $>100\text{km}$ , then damping timescales are long, so any eccentricity would ~~not~~ be able to persist, since dust at late times is derived from the largest planetesimals.

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Section & Talk by ..... *Mr. Wyatt* .....

Name/Question..... *R. Liseau* .....

*Is it possible to infer the disc/ring masses from the separation of ring and planet?*

Name/Answer..... *Mark Wyatt* .....

*The current Chiang et al. models for Fomalhaut assume that the disc is massless, which is valid if the disc is much less massive than the planet. Models including self gravity of the ring are being explored and could in theory be constrained in this way.*

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