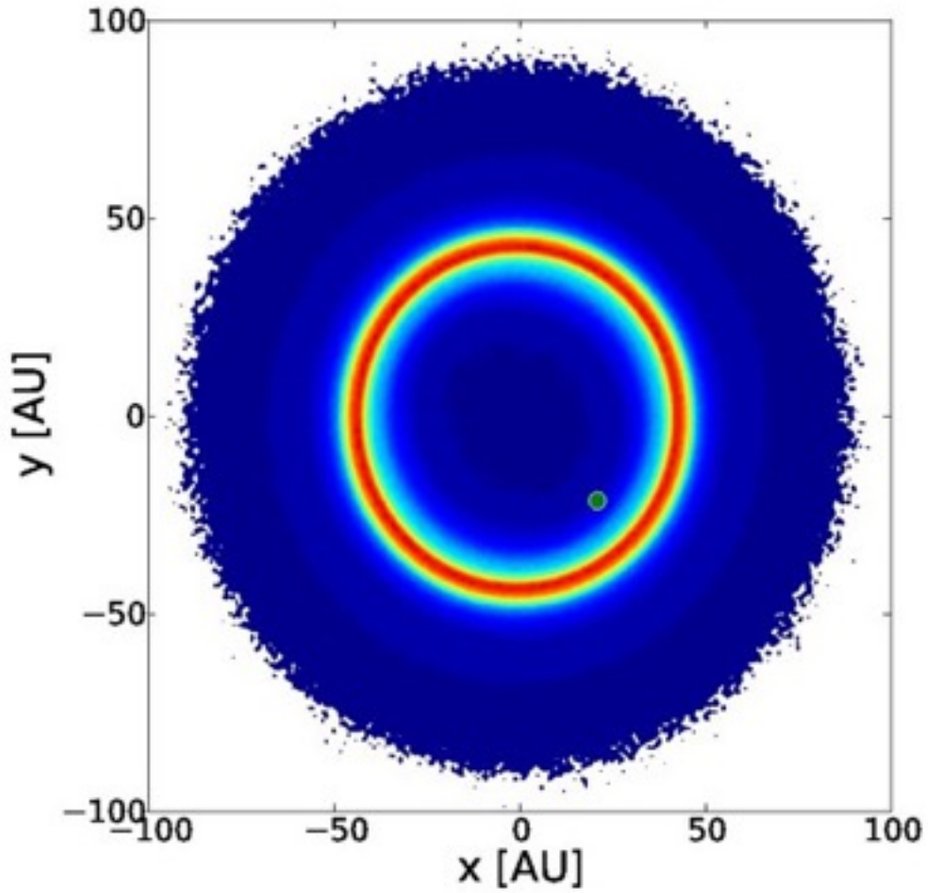
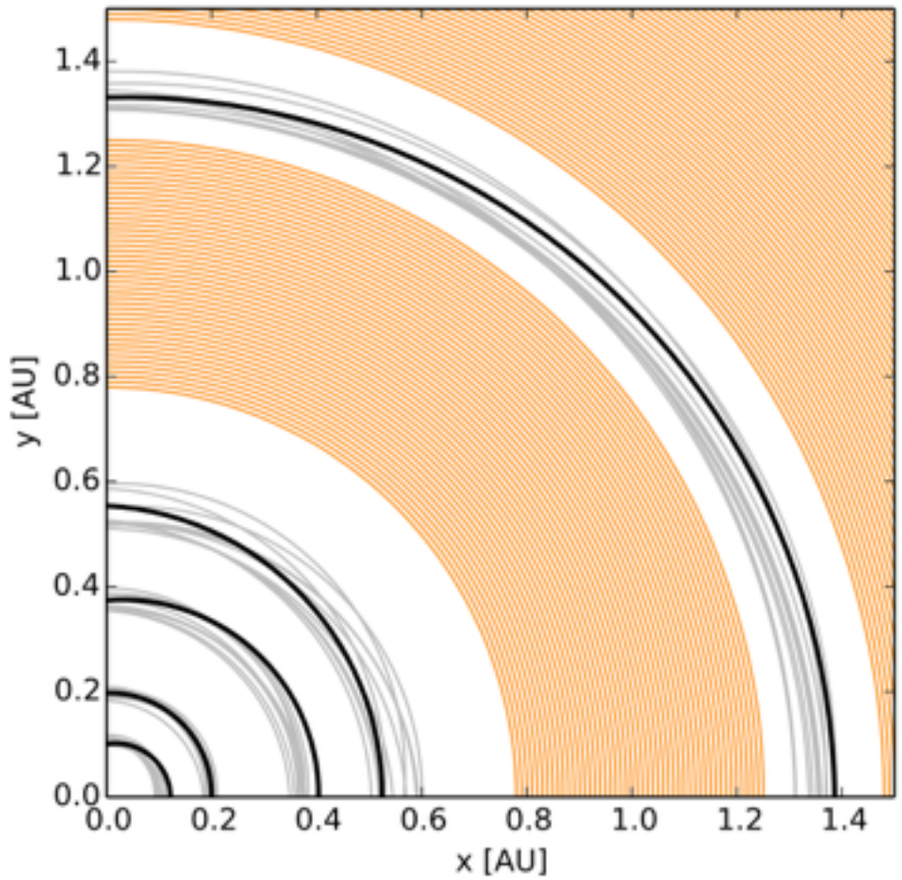
Sam Lawler

Plaskett Fellow, NRC-Herzberg, Victoria



Kuiper Belt + Neptune; Lawler 2014

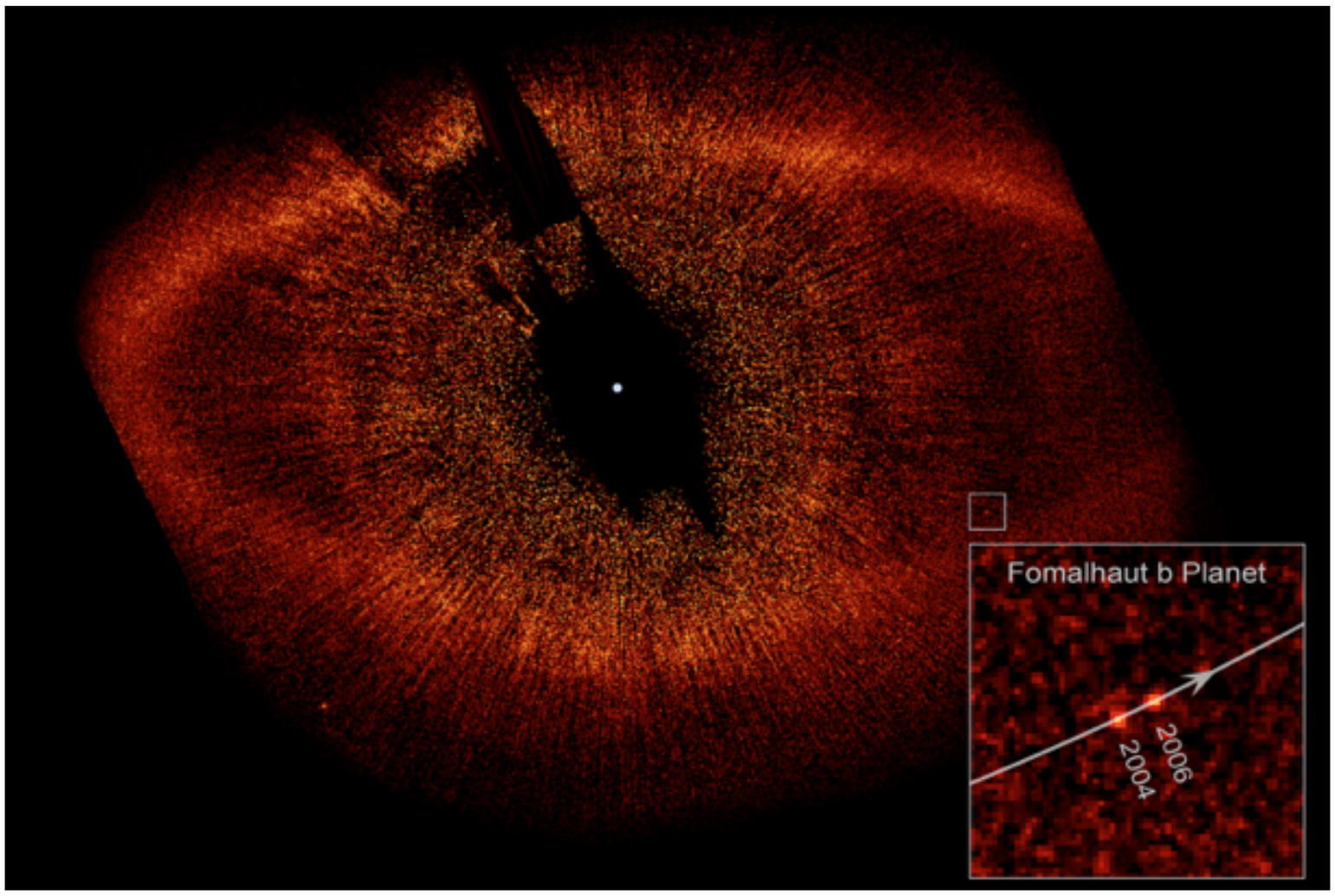


τ Ceti planets b-f + disk; Lawler et al. 2014

Modelling planet-disk dynamical interactions

Debris Disks:

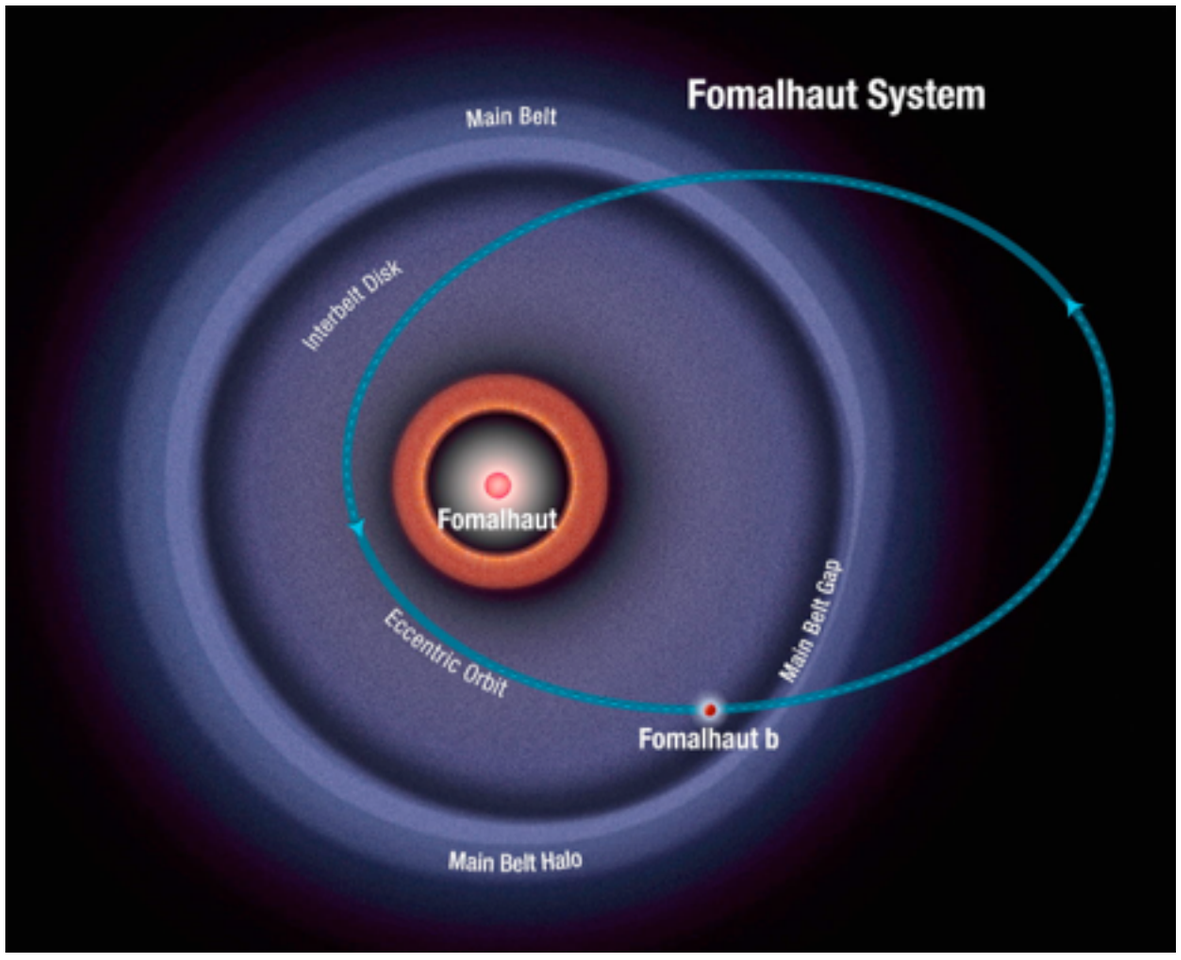
Colliding planetesimals create dust



Fomalhaut b:

Can we see an individual collision?

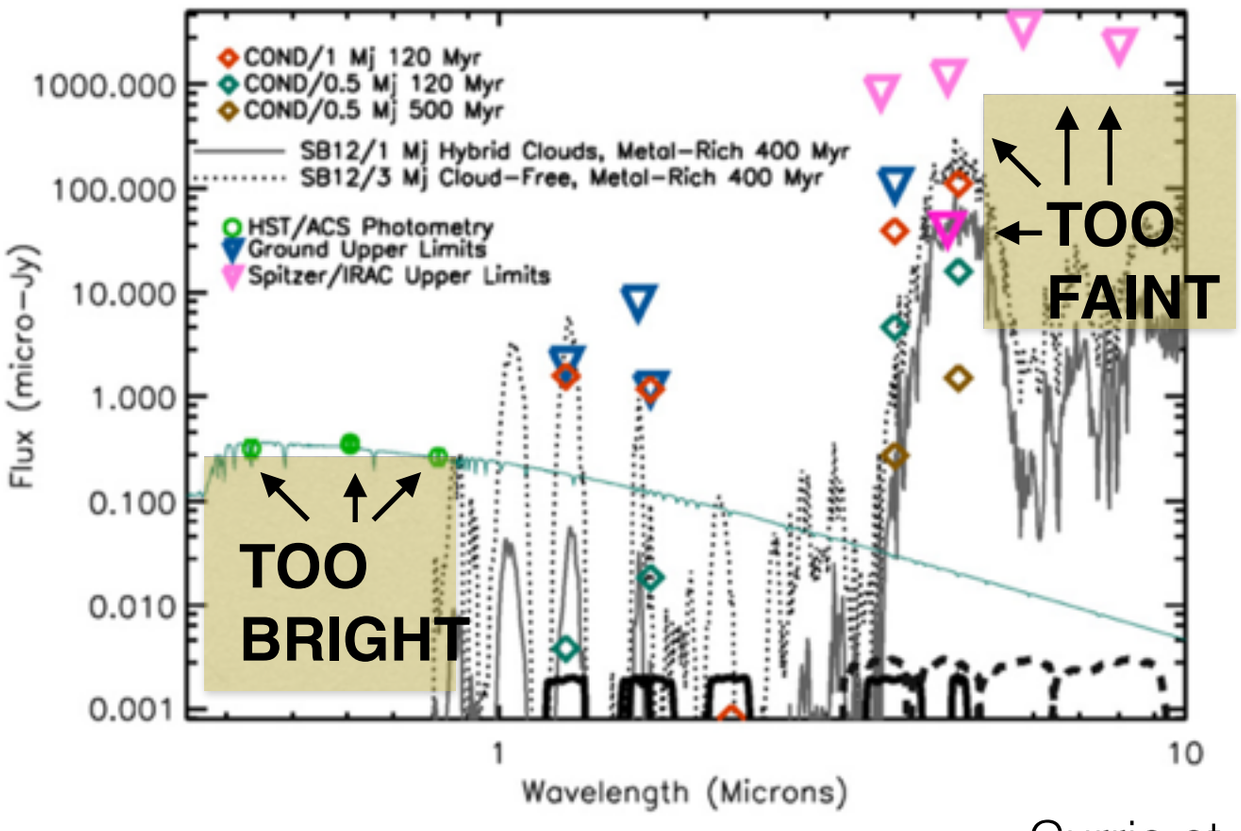
Fomalhaut b: planet candidate



Kalas et al. 2013

<u>Weird orbit:</u>
will disrupt debris ring within few Myr at most

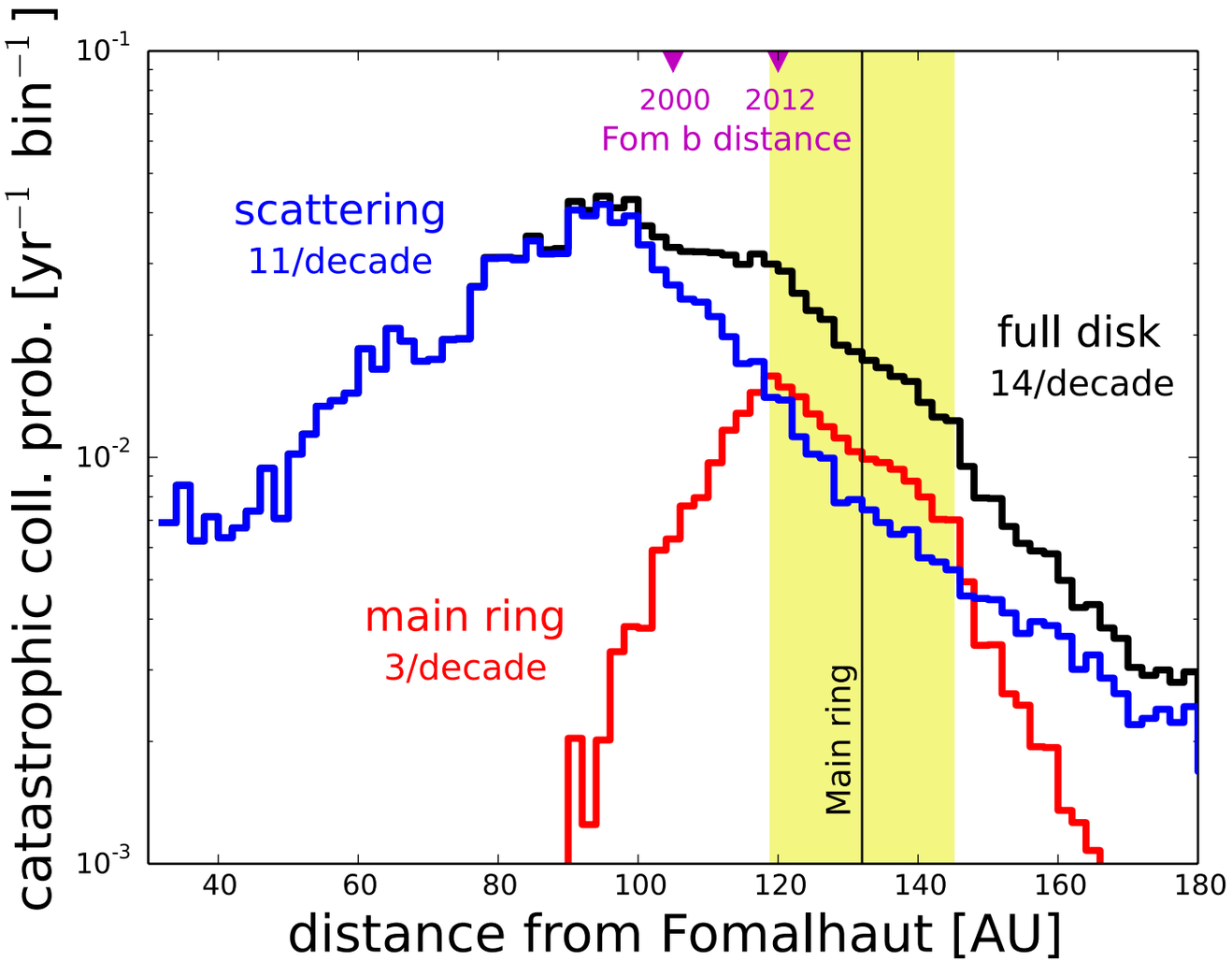
<u>Weird spectrum:</u>
too bright in optical, too faint in IR



Currie et al.

Fomalhaut b: Just a dust cloud?

Lawler, Greenstreet, & Gladman 2015



Simulations based on the structure of the Kuiper belt show that a dust cloud resulting from a catastrophic collision is likely to be visible at any given time

How bright would a dust cloud be?

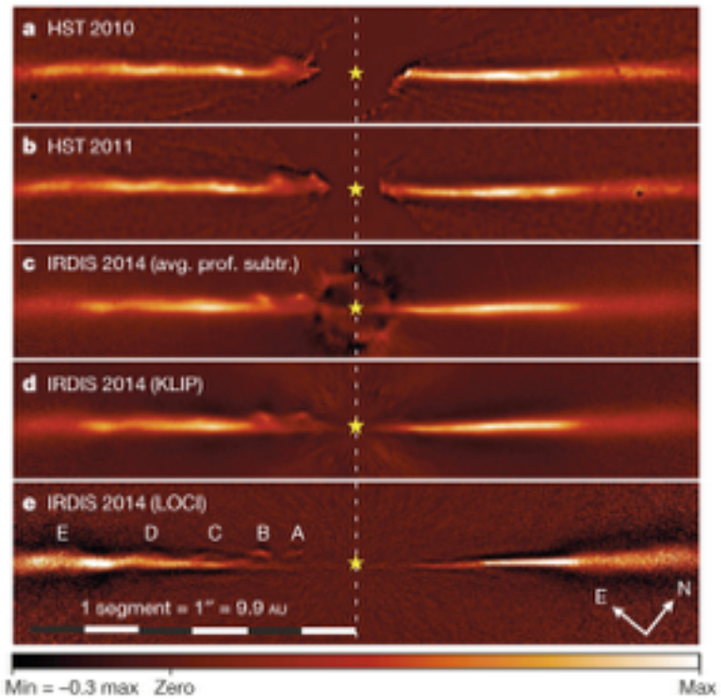
Fomalhaut is an A star at 8 pc. Fom b is 120 AU from star.
Fom b needs a scattering surface area equivalent to a 300-Earth radius planet
Assuming it's optically thin:

	Distance	Magnitude (J)
observed	120 AU	23
OWA for a system at 100 pc	70 AU	22
OWA for a system at 10 pc	7 AU	17
IWA for a system at 10 pc	0.7 AU	12

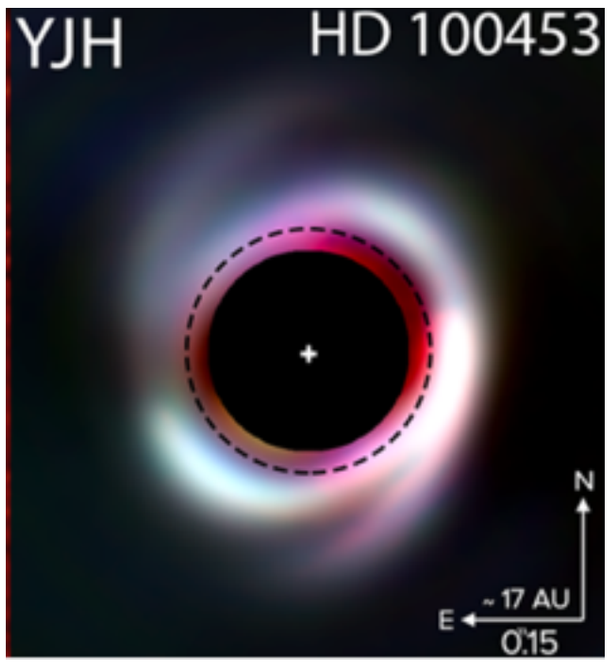
Using the Fomalhaut system model, collisions of this scale should happen with frequency ~few/decade

Observed planet-caused disk structures

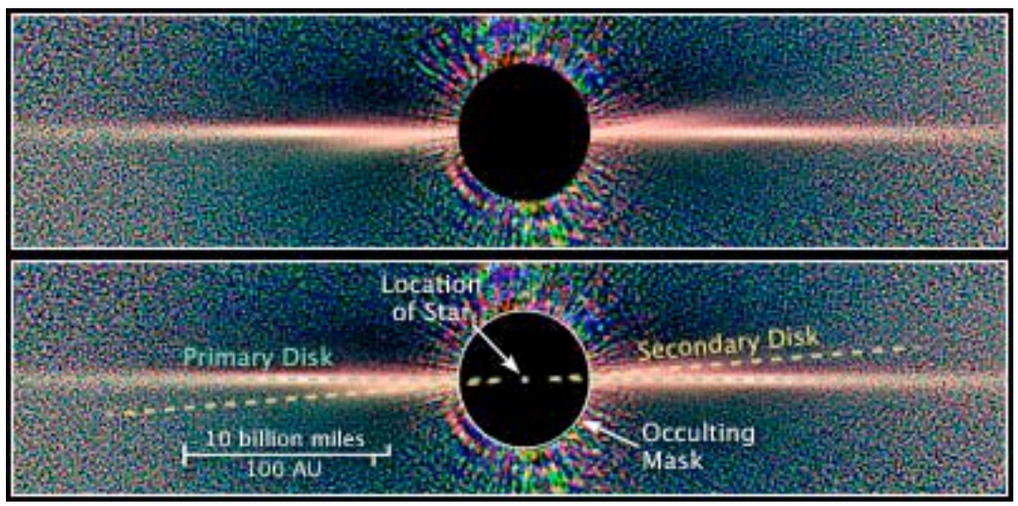
(all in scattered light)



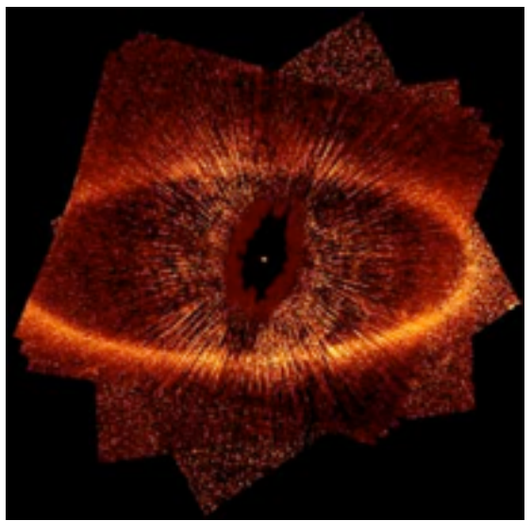
Edge-on spiral, **AU Mic**
Boccaletti et al. 2015



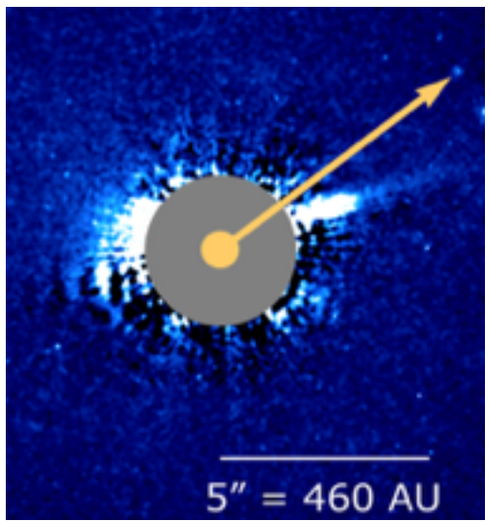
Face-on spiral, **HD 100453**
Wagner et al. 2015



Warp, **HD 100453**
Golimowski et al. 2006



Eccentric ring, **Fomalhaut**
Kalas et al. 2005



Asymmetric, **HD 106906**
Kalas et al. 2015