


Planet gap opening across stellar masses

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Motivation and questions

Many discs have rings and they may be due to planets.

- **How massive must a planet be to create a ring?**
- **How does this vary with the distance from the star?**
- **How does this vary with the host stellar mass?**

Theoretical expectation

$$\frac{M_{pl,m}}{M_*} \propto \left(\frac{H}{r}\right)^3$$

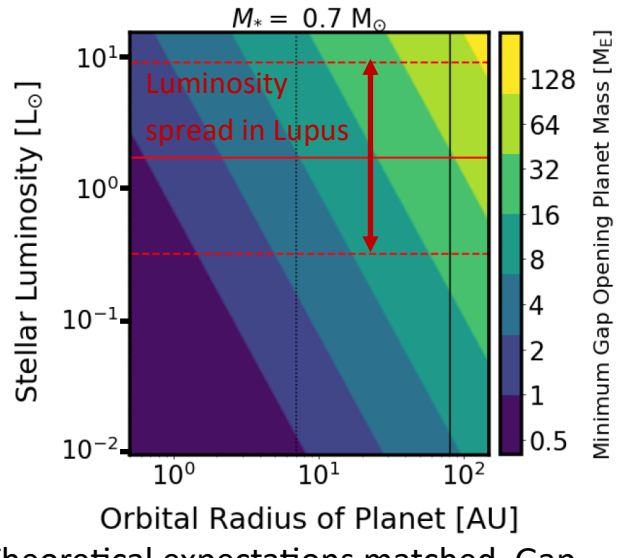
Depends on disc aspect ratio, i.e. temperature. Therefore varies with distance from the star and stellar luminosity

Methods

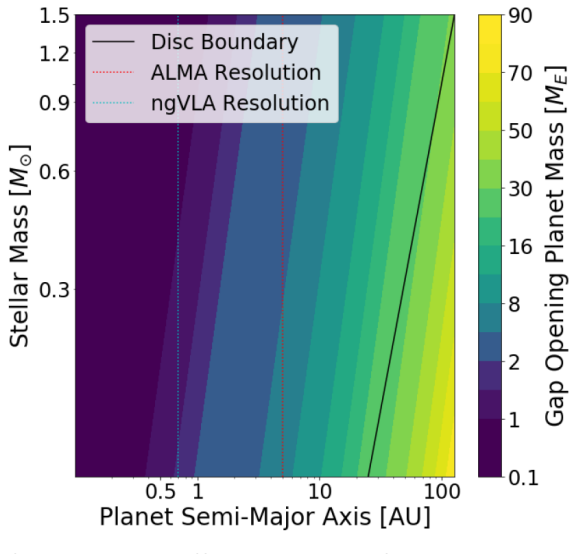
To verify the prediction, we do:

- Dust and gas hydro simulations
- Radiative transfer
- CASA simulations to include ALMA observational effects

Results



Theoretical expectations matched. Gap opening more difficult far from the star and for high stellar luminosities



Possible to use stellar mass with average luminosity, but keep in mind there is large spread in luminosities for any stellar mass.

Conclusions

- Gap opening more difficult far from the star and for high stellar luminosities. Quantitative expressions in the paper (QR code on the right)
- Stellar luminosity crucial parameter for gap opening mass