Planet formation in post common envelope binaries

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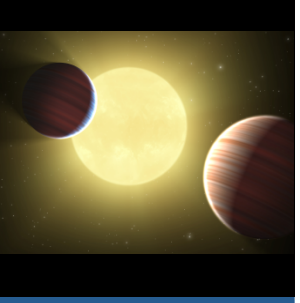
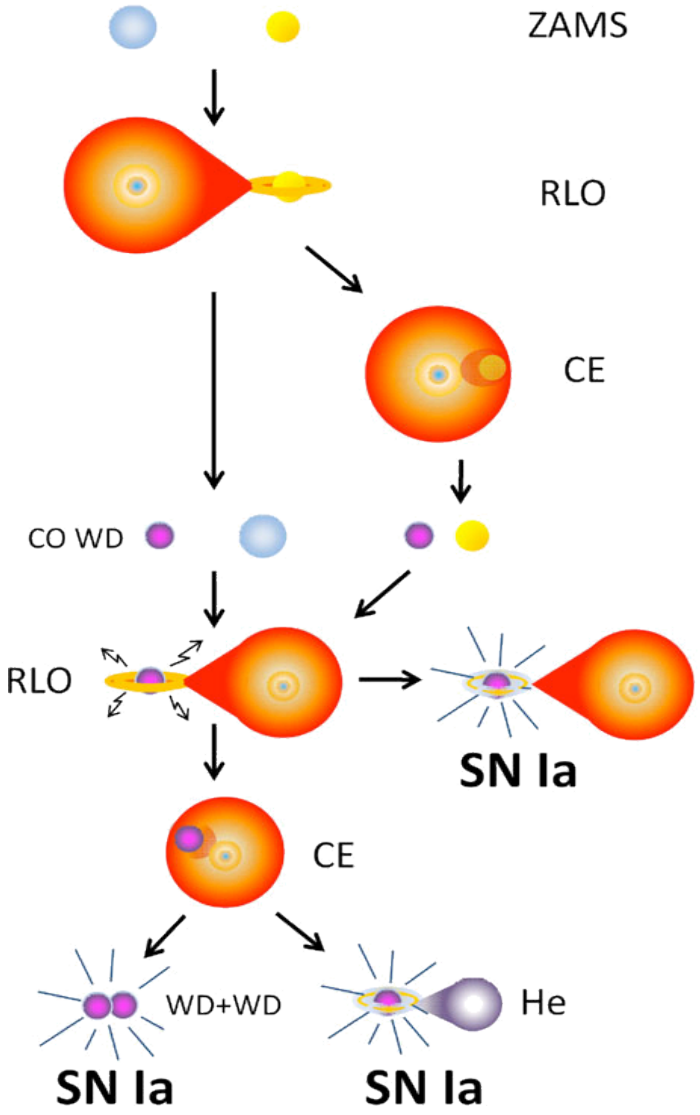
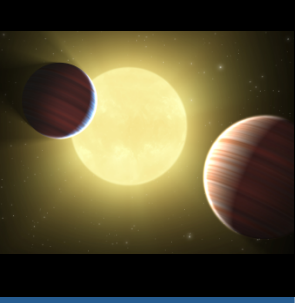


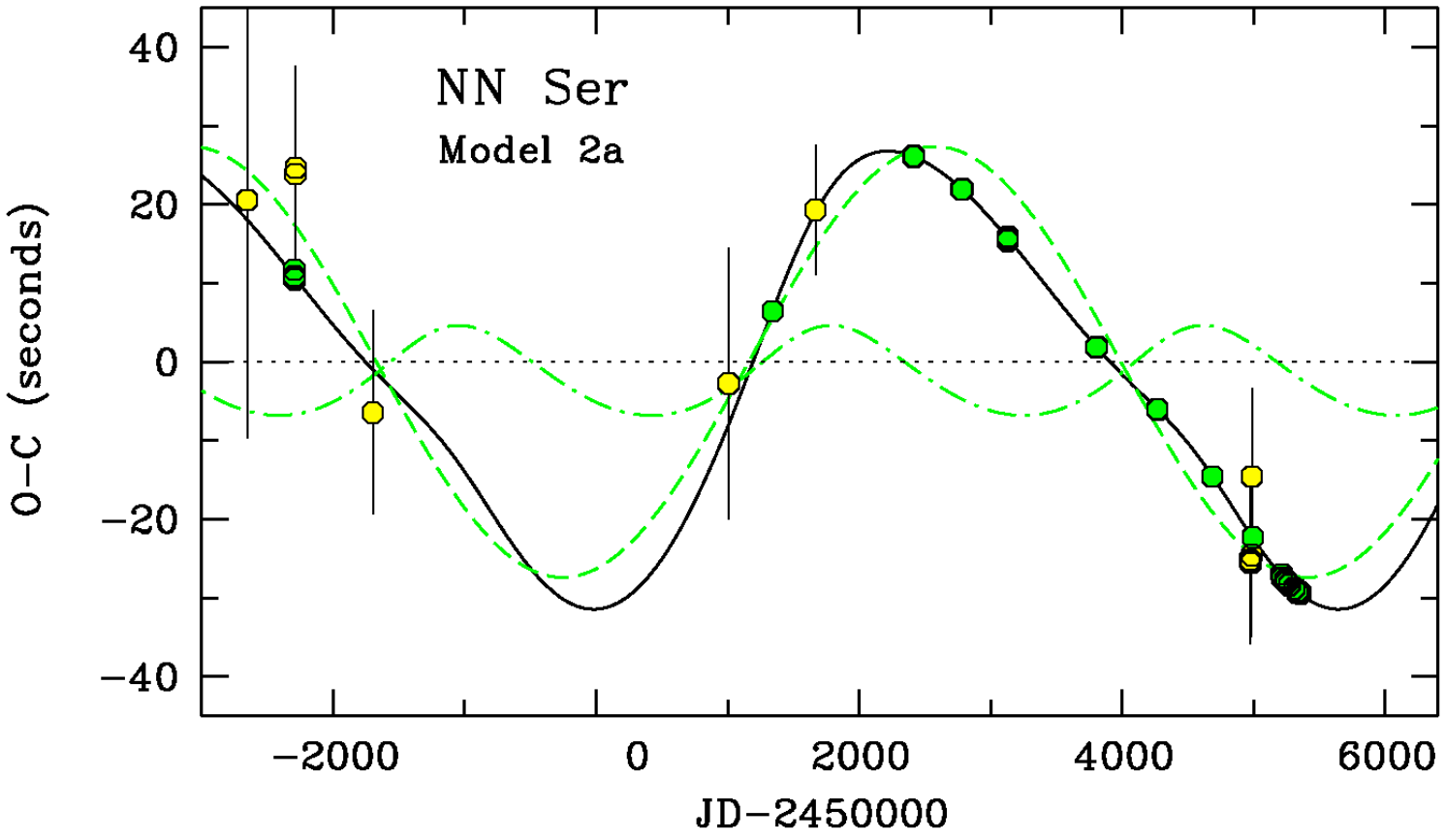
Common envelope evolution



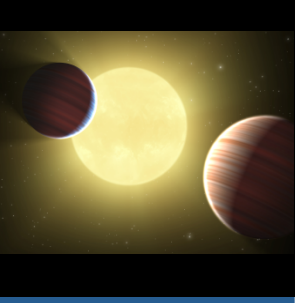
Ivanova et al. (2011)



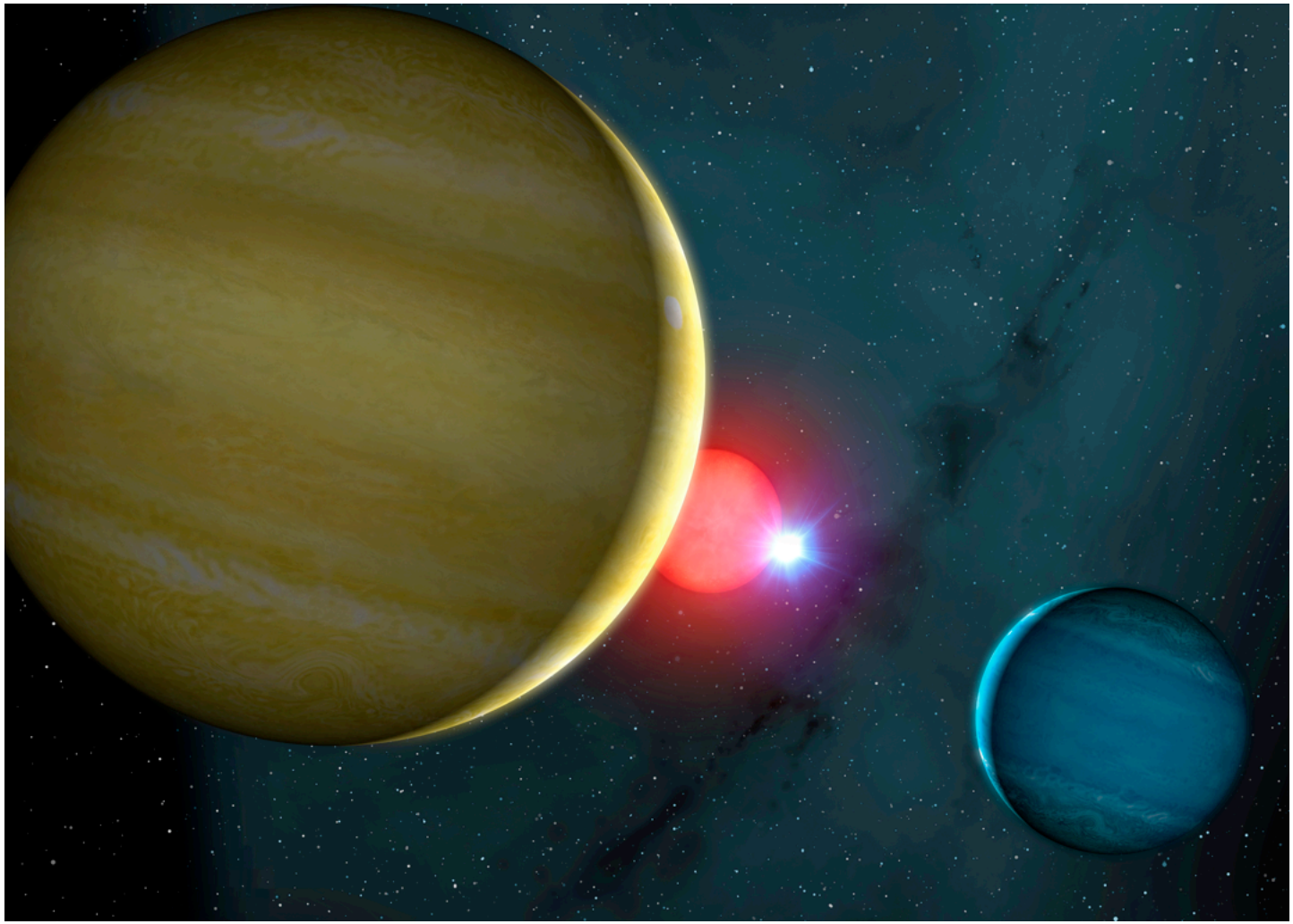
Observational evidence



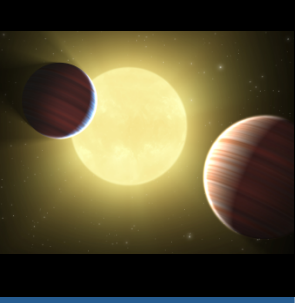
Beuermann et al. 2010, 2013



NN Serpentis

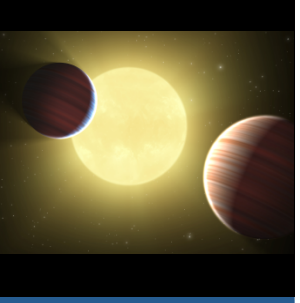


Beuermann et al. 2010, 2013

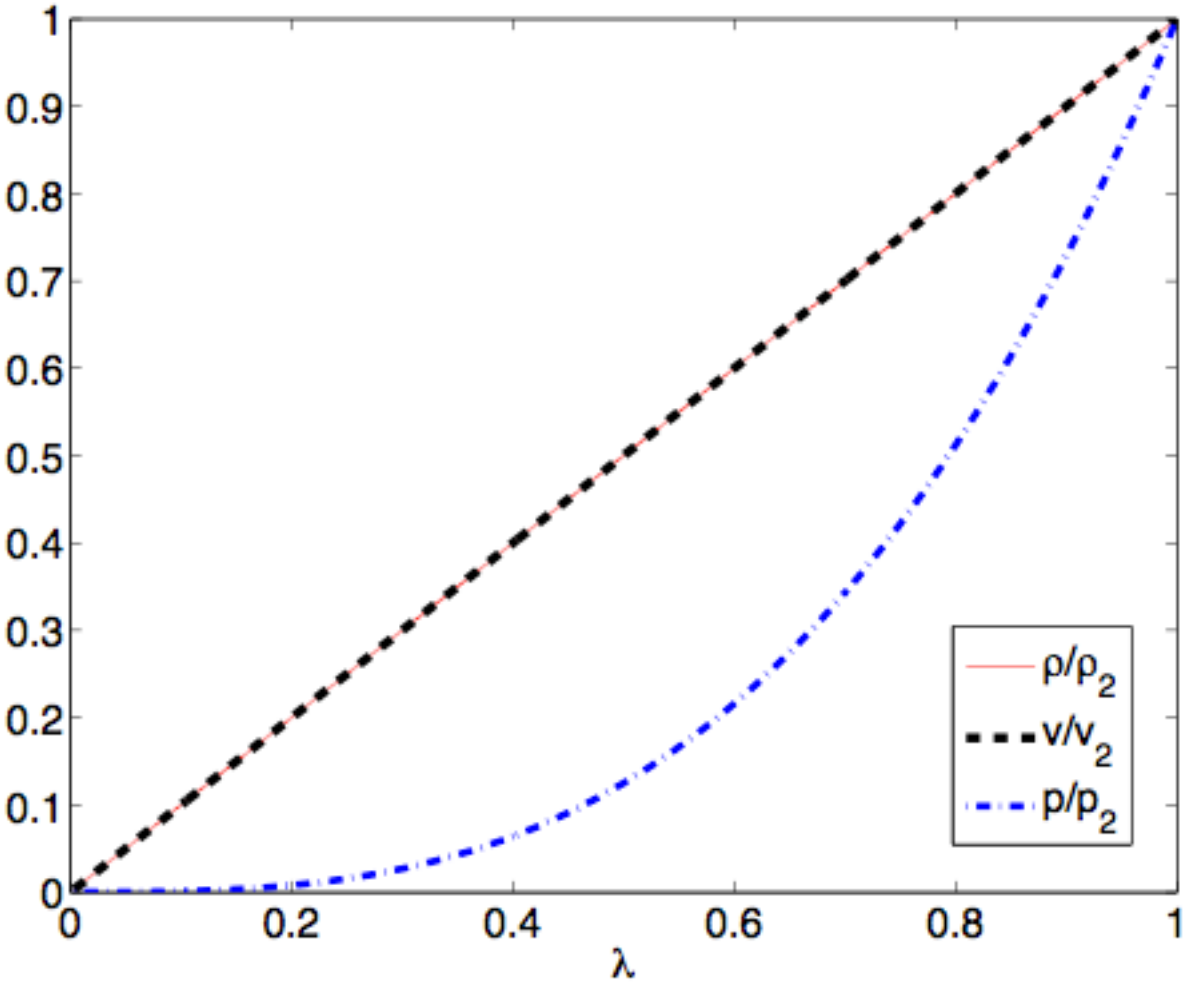


Origin of planets

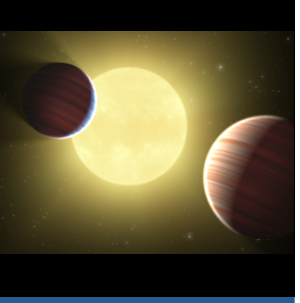
- First generation scenario:
  - Formation before the common envelope phase
  - Expect high eccentricities due to ejected material
  - See posters by M. Völschow and C. Diehl for constraints and simulations
- Second generation scenario:
  - Planets form after the common envelope phase due to gravitational instabilities
  - Explains planetary masses in NN Ser



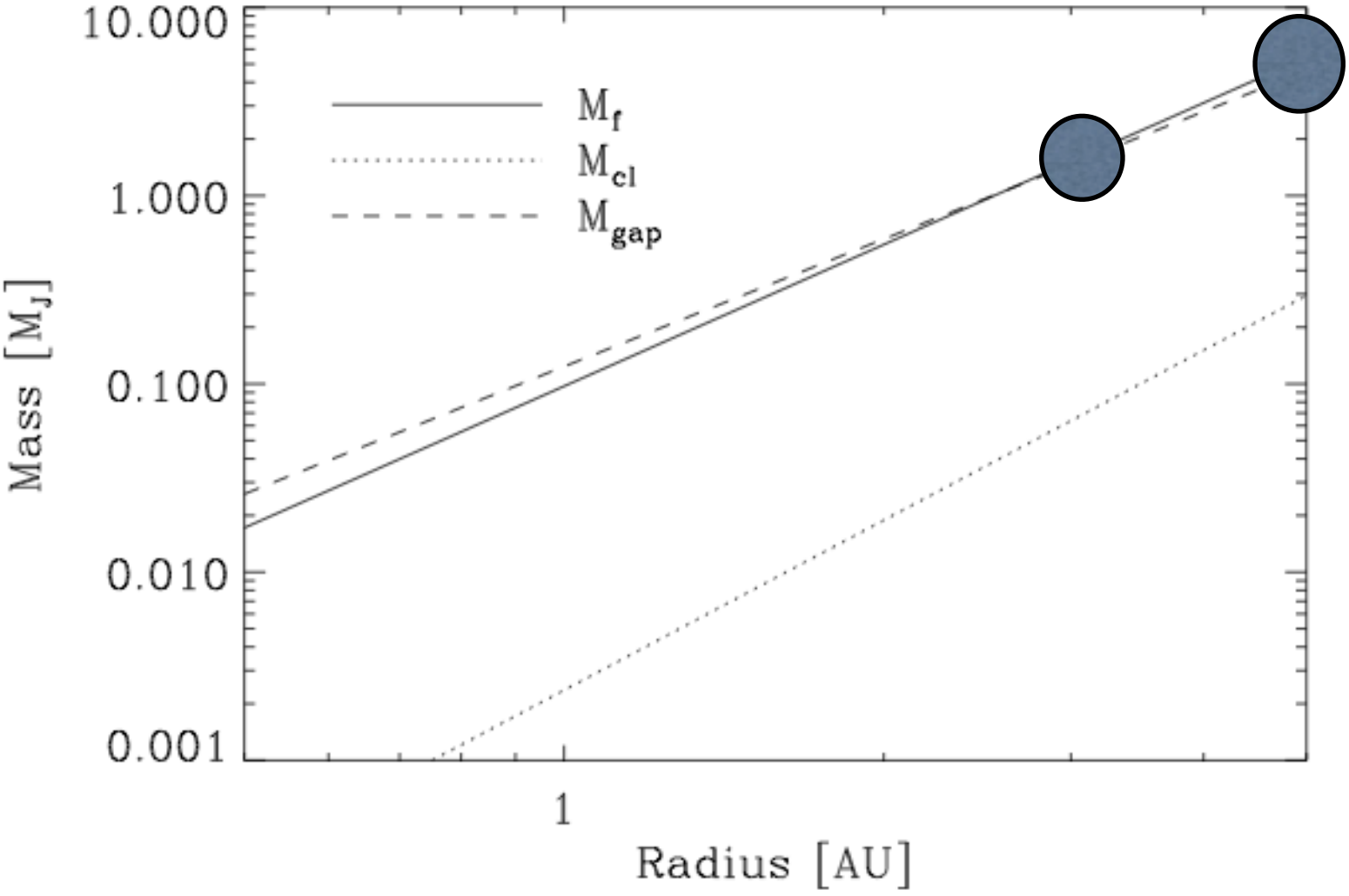
Ejection model by Kashi & Soker



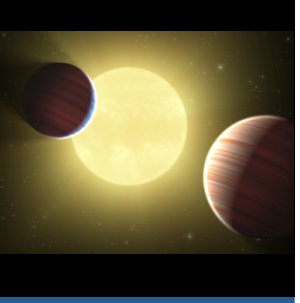
Ejection modeled as Sedov explosion in 1/r^2 density profile
(Kashi & Soker 2011)



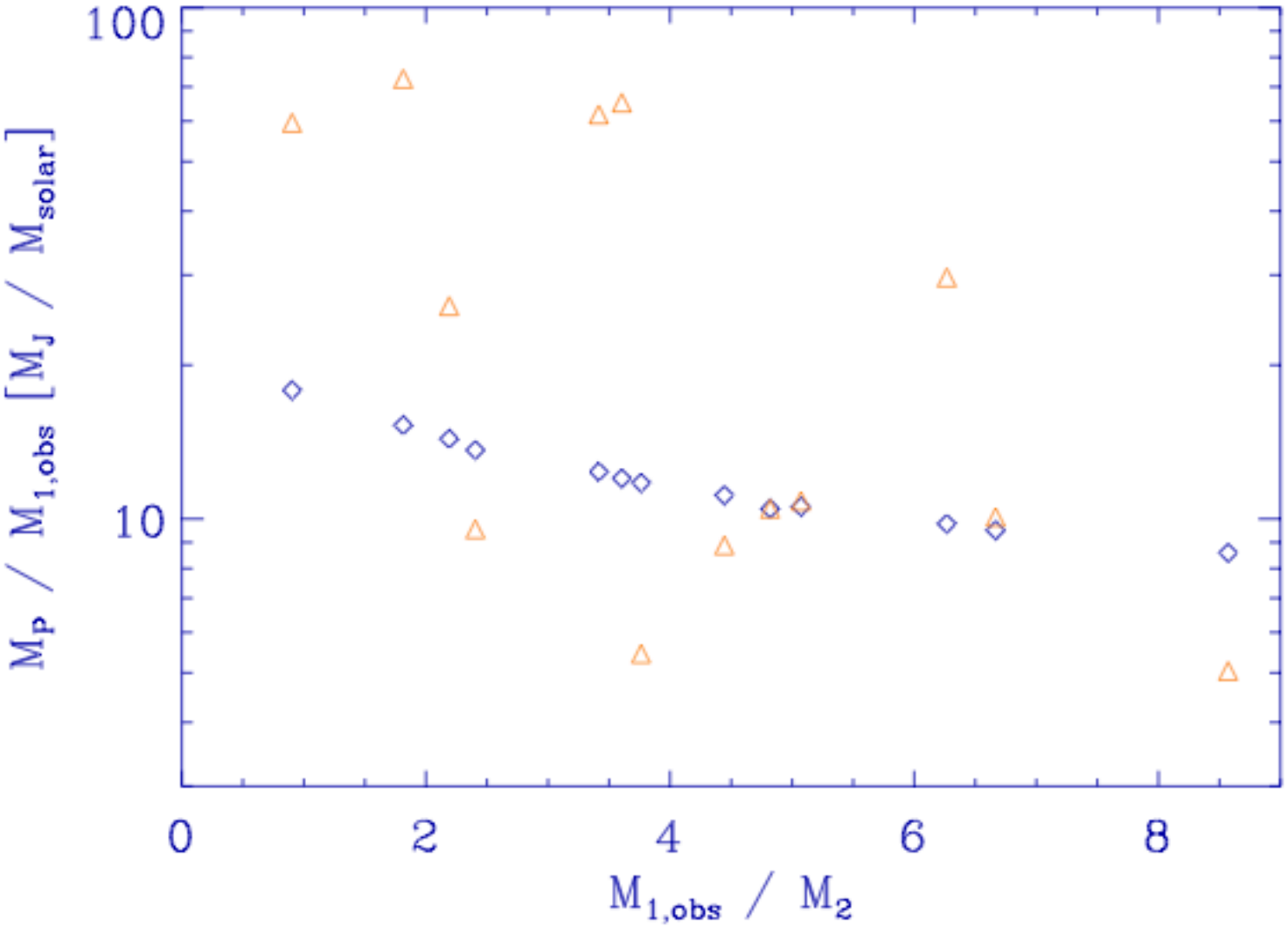
Expected planetary masses



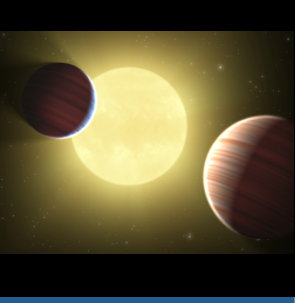
Fragmentation mass scale due to gravitational instabilities
(Schleicher & Dreizler 2014)



Comparison with observed population

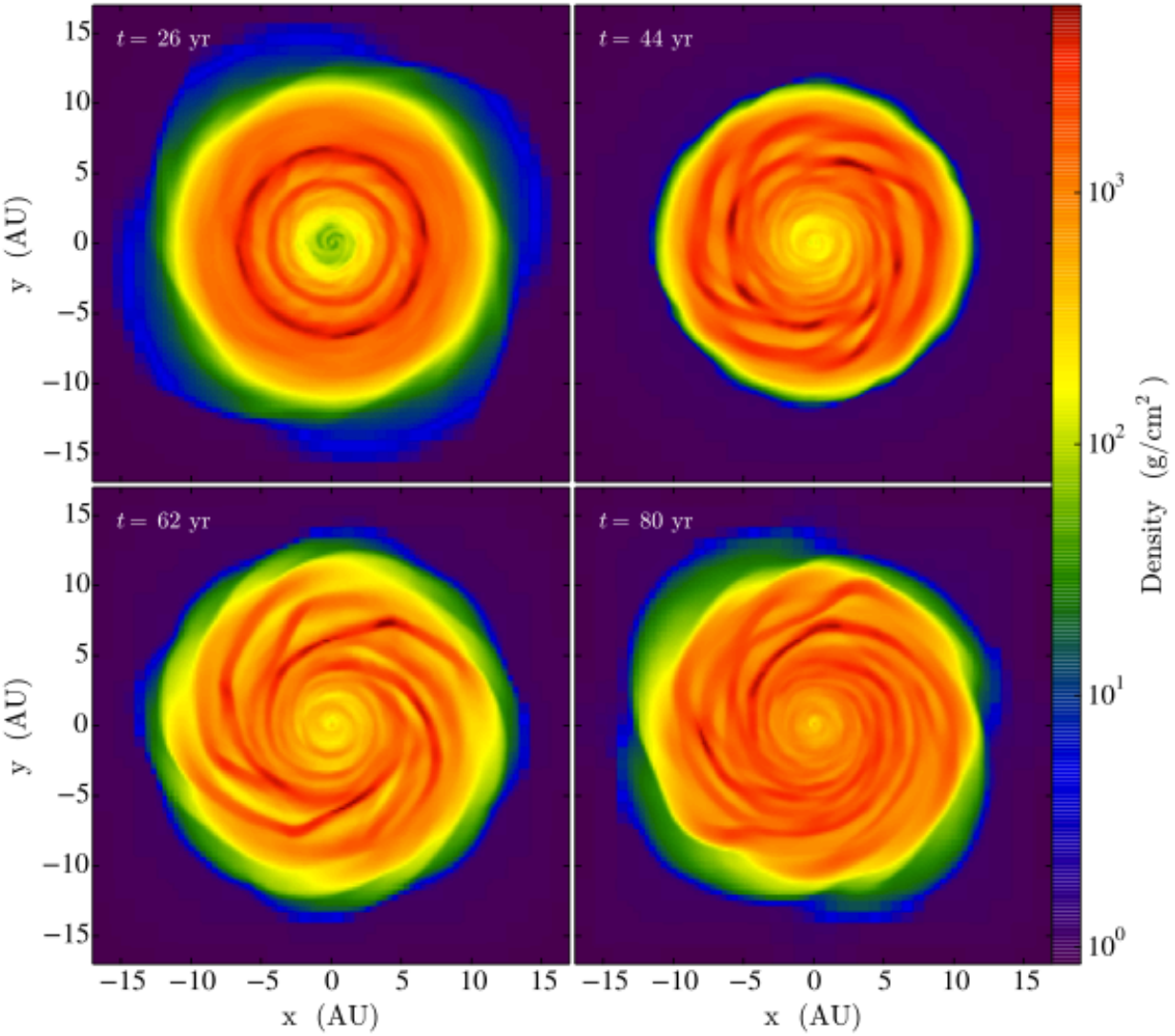


Schleicher & Dreizler (2014)

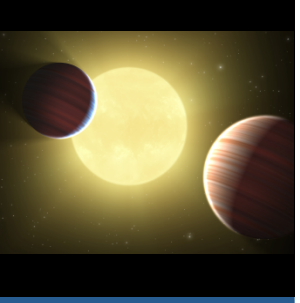


Astrophysical Flow Instabilities and Turbulence
Planet formation in common envelopes

Fragmentation of a self-gravitating disk



Master thesis Tim Lichtenberg (see also poster)



Conclusion

- Observations suggest the presence of massive planets in post common envelope binaries
- First generation scenarios difficult for planets with low eccentricity
- Gravitational instabilities in the ejected material may explain planet formation on short timescales.
- Fragmentation mass scale naturally explains the formation of giant planets.