
"Planetary systems in Universidade de Aveiro"
Alexandre Correia (Ass. Prof.)
Helena Morais (Ciência 2008)
André Gomes (Bach. Student)
Diana da Cunha (Ms. Student)
Álvaro Almeida (Ms. Student)
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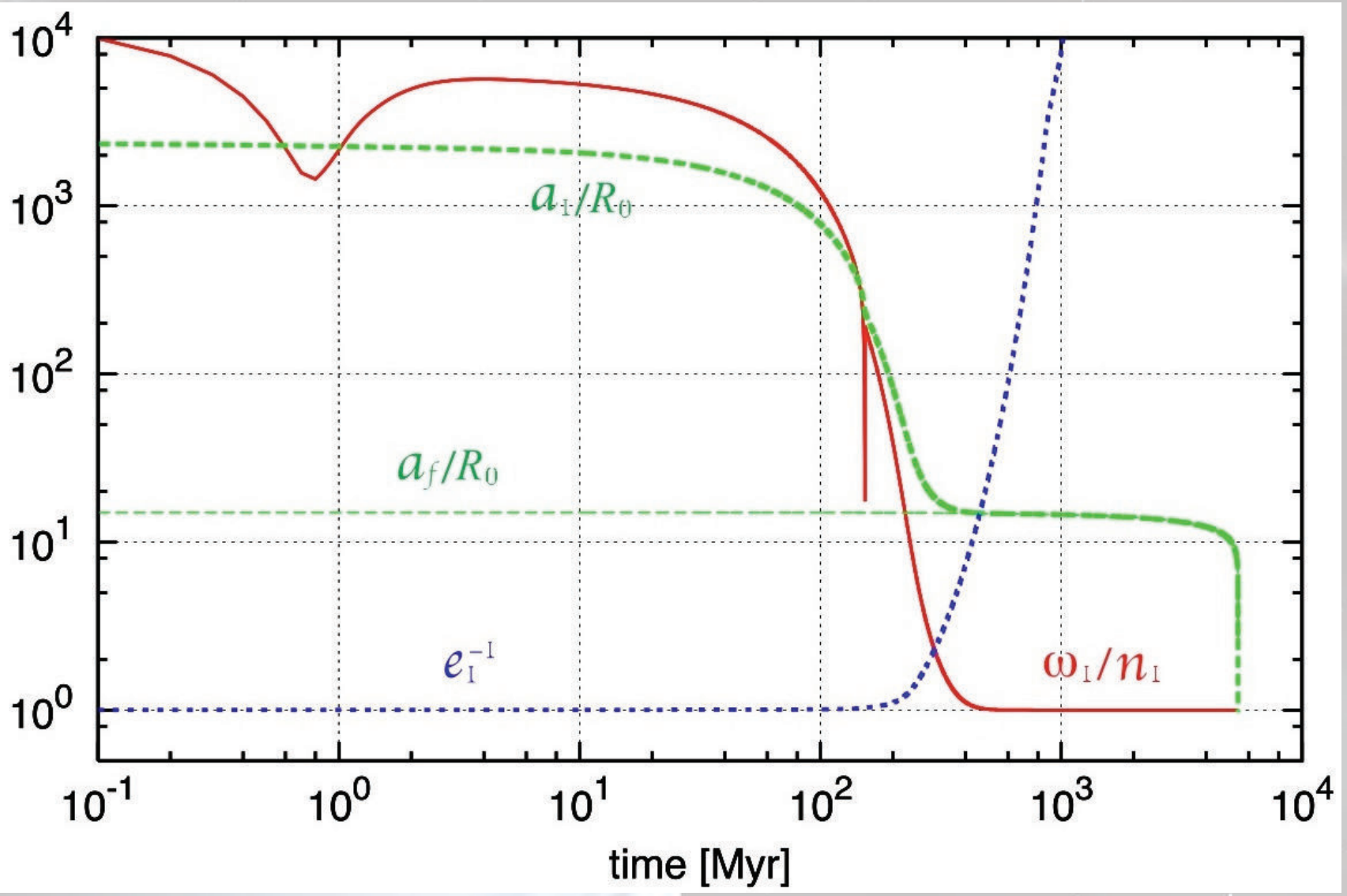
Main research lines:

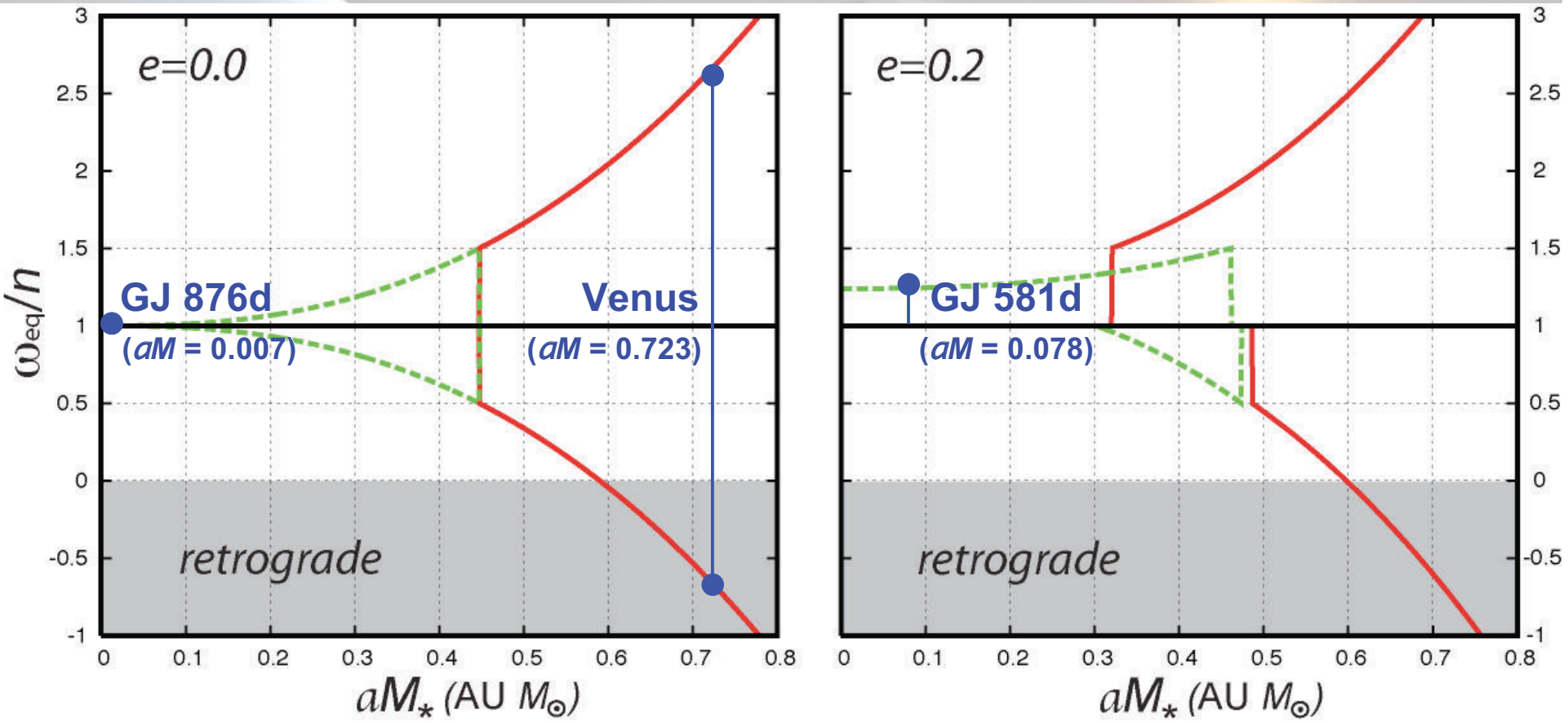
- **Solar System evolution: we try to explain the presently observed configurations from initial formation models.**
- **Solar System evolution: we try to explain the future evolution of the system.**
- **Extra-solar systems: we help the observers to better constrain the observational data.**
- **Extra-solar systems: we analyze the already detected systems searching for coherence in the orbits and derive additional constraints.**
- **Extra-solar systems: we try to estimate the spin evolution of the planets in order to obtain climate constrains.**

Tidal evolution of Triton



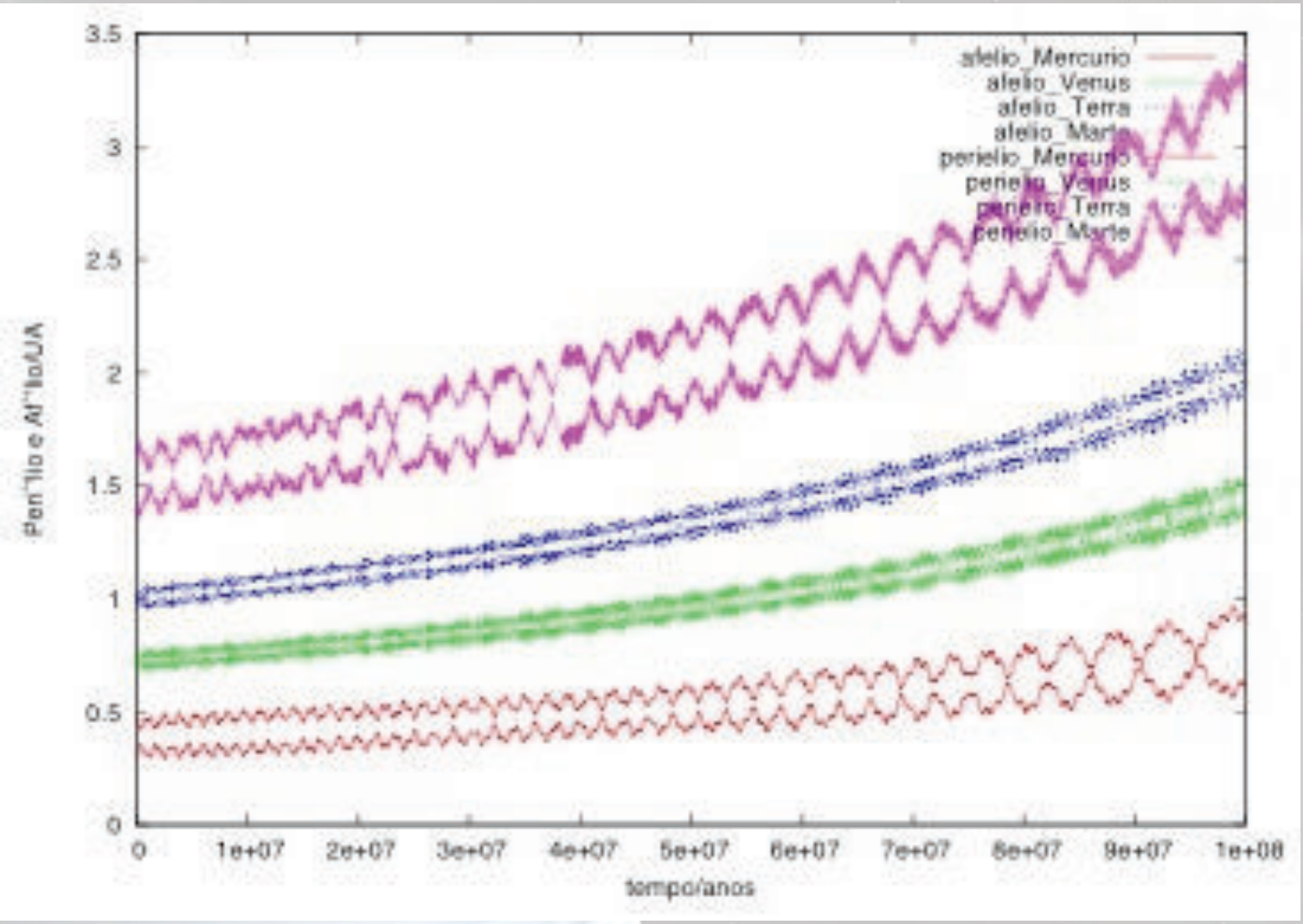
Correia, Aph.J.Lett. (2009)

Equilibrium Spin for Super-Earths



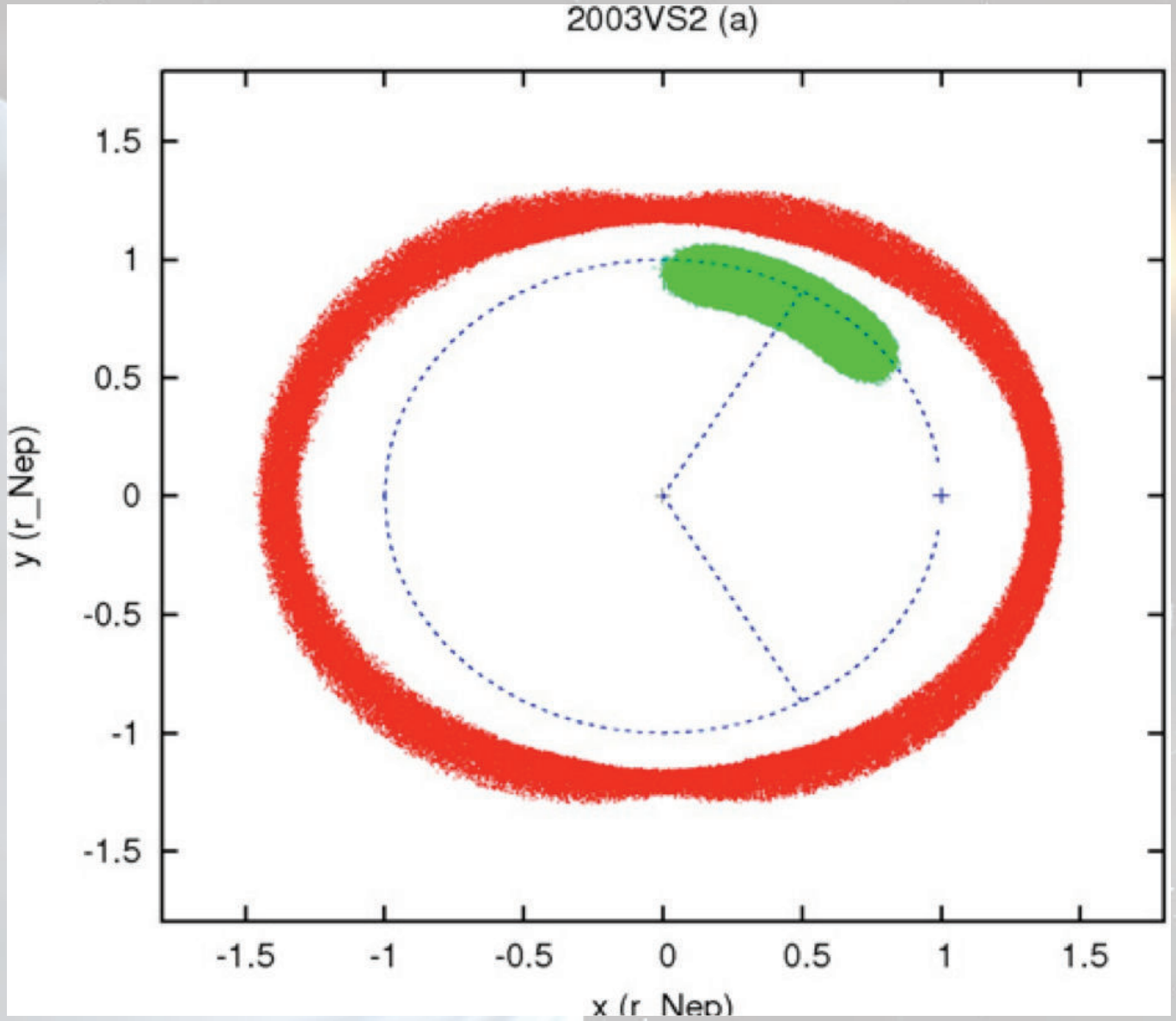
Cunha et al., sub, (2010)

Final evolution of the Solar System



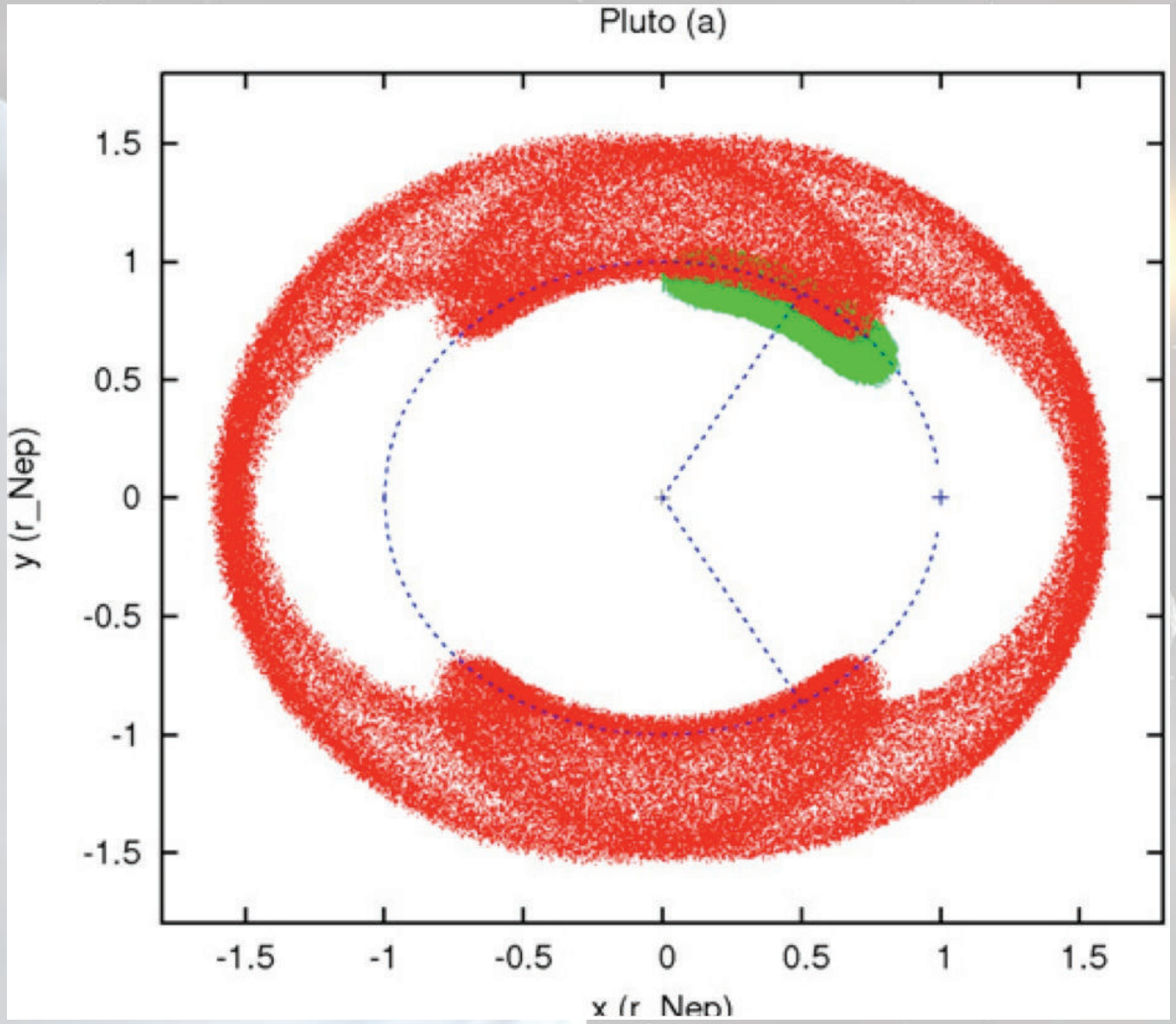
Gomes et al., sub, (2010)

Possible collisions between TNOs



Almeida, Peixinho et al., A&A, (2009)

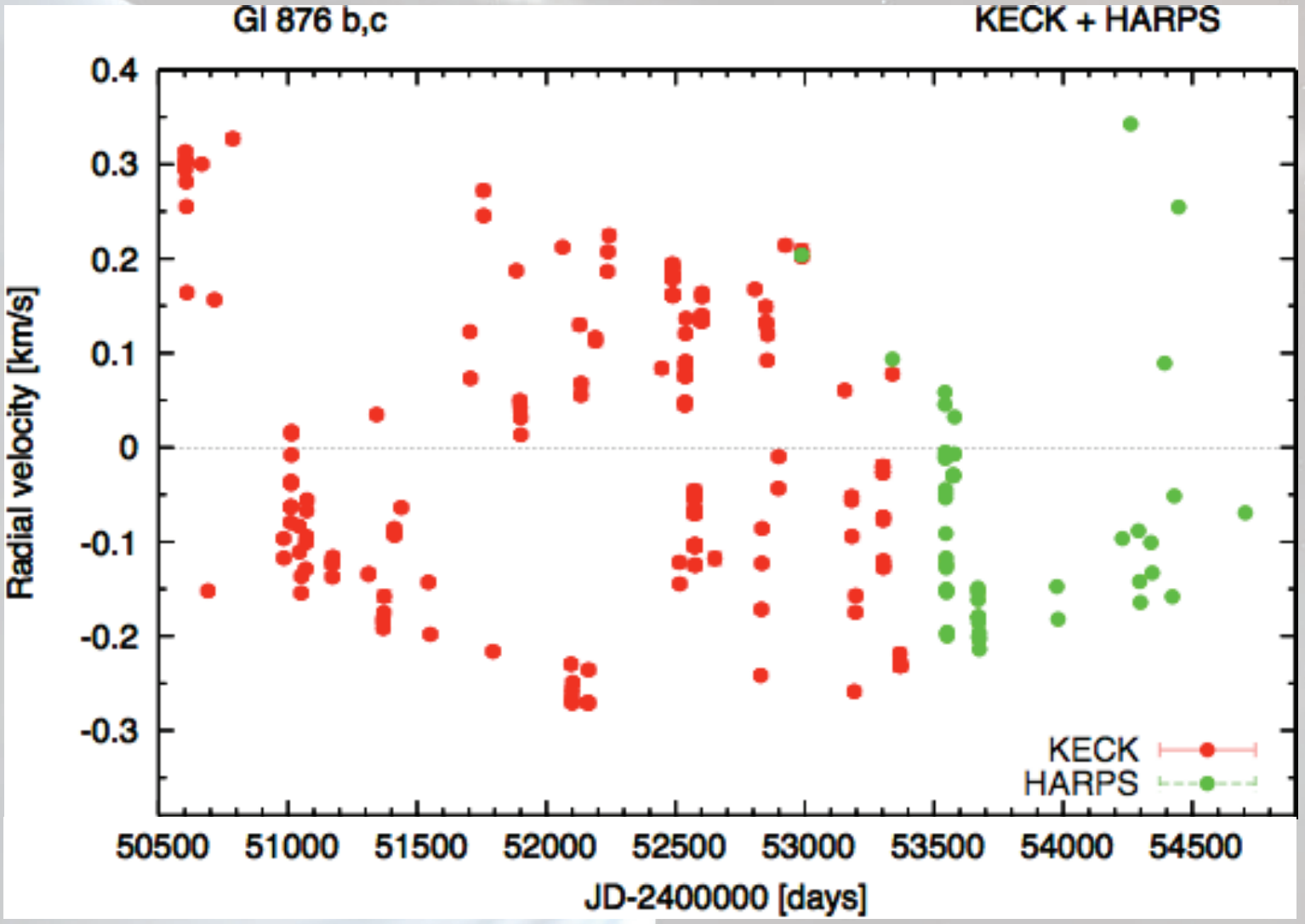
Possible collisions between TNOs



Almeida, Peixinho et al., A&A, (2009)

GJ 876, a "case study"

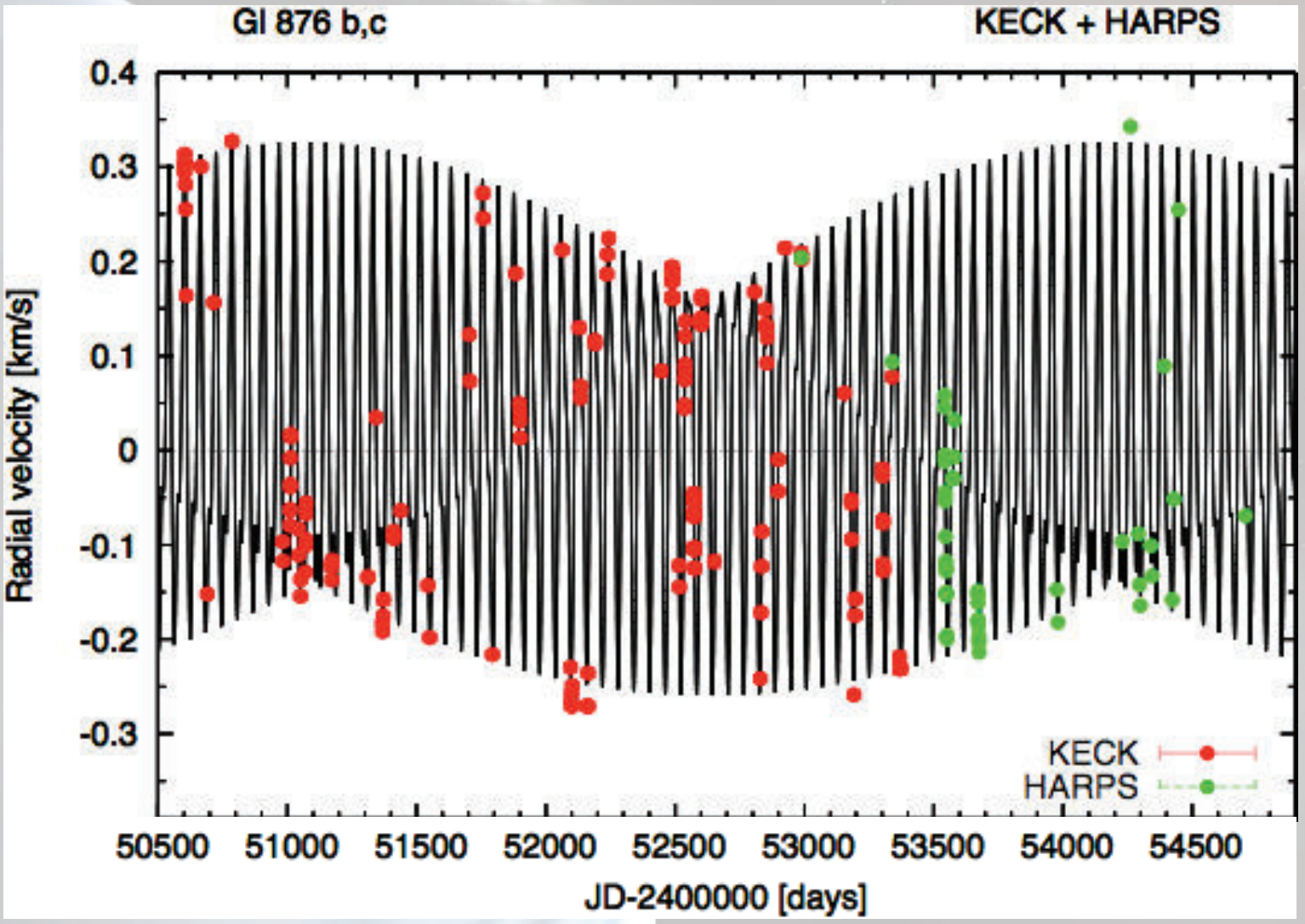
KECK - *HARPS*



Correia et al., A&A, (2010)

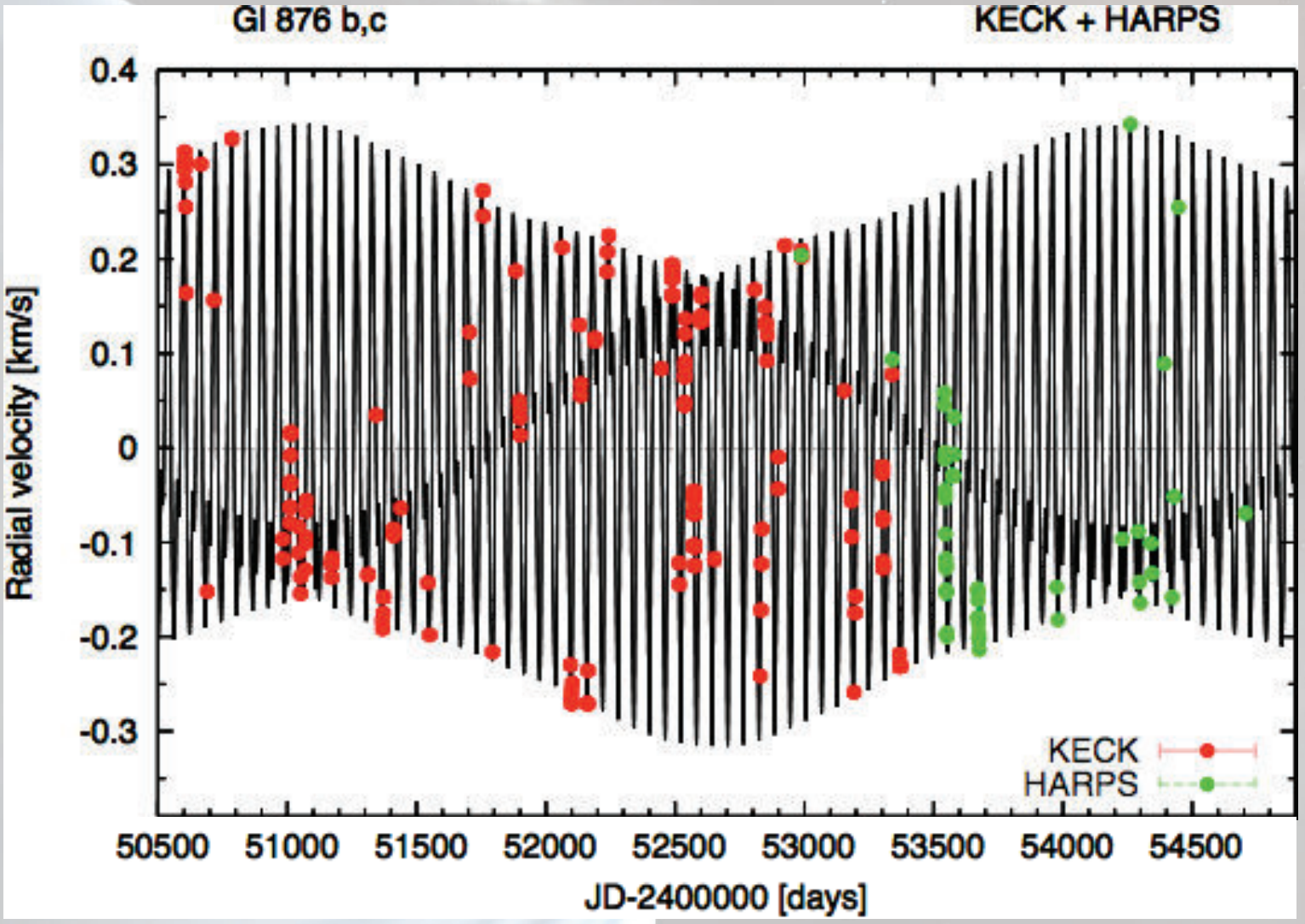
2 planets, two keplerian orbits

χ^2=6.41 i = ?? rms = 11.0 m/s



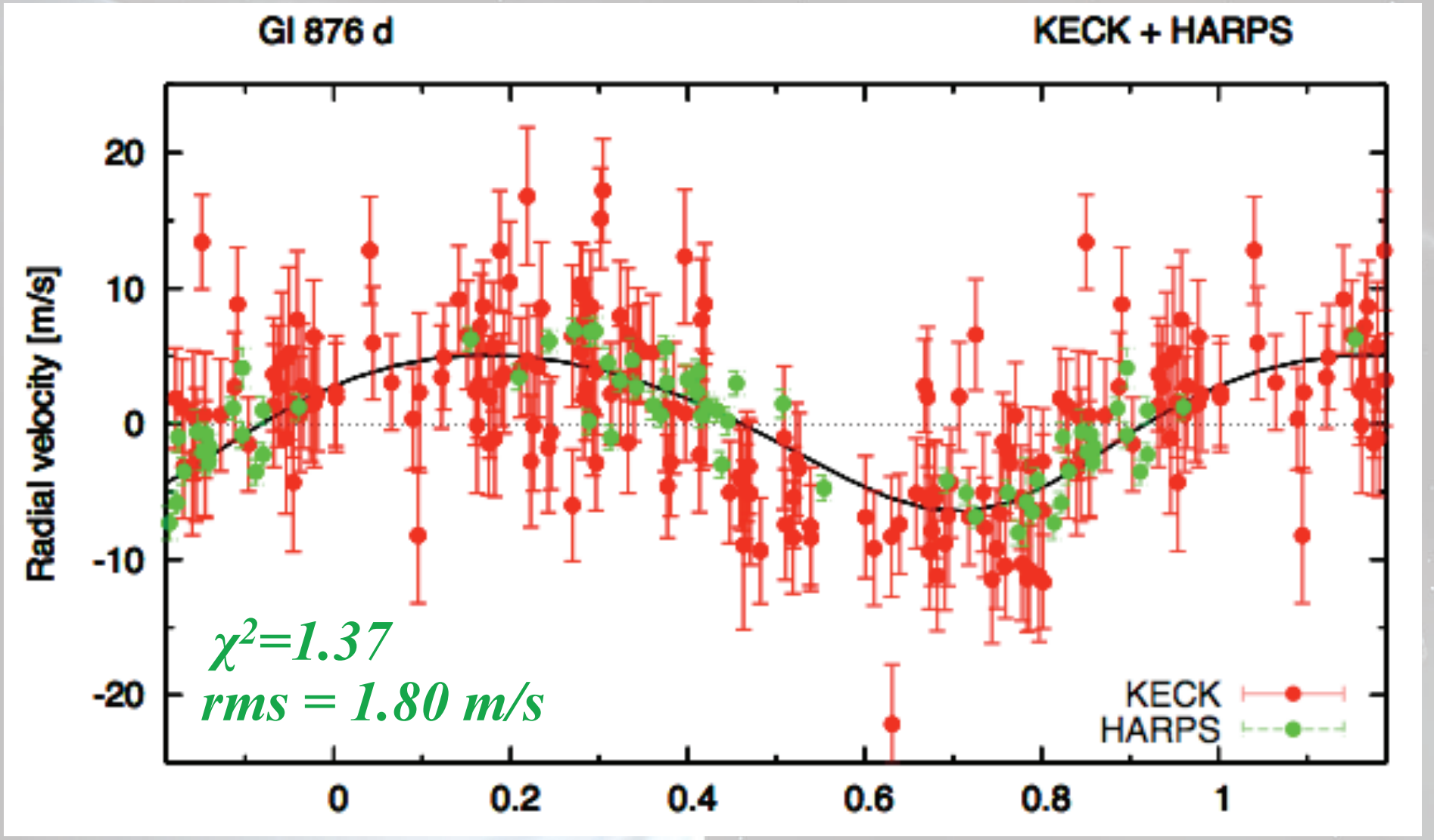
2 planets, planet-planet interaction

$\chi^2=2.60$ $i = 49^o \pm 1^o$ $rms = 4.45$ m/s



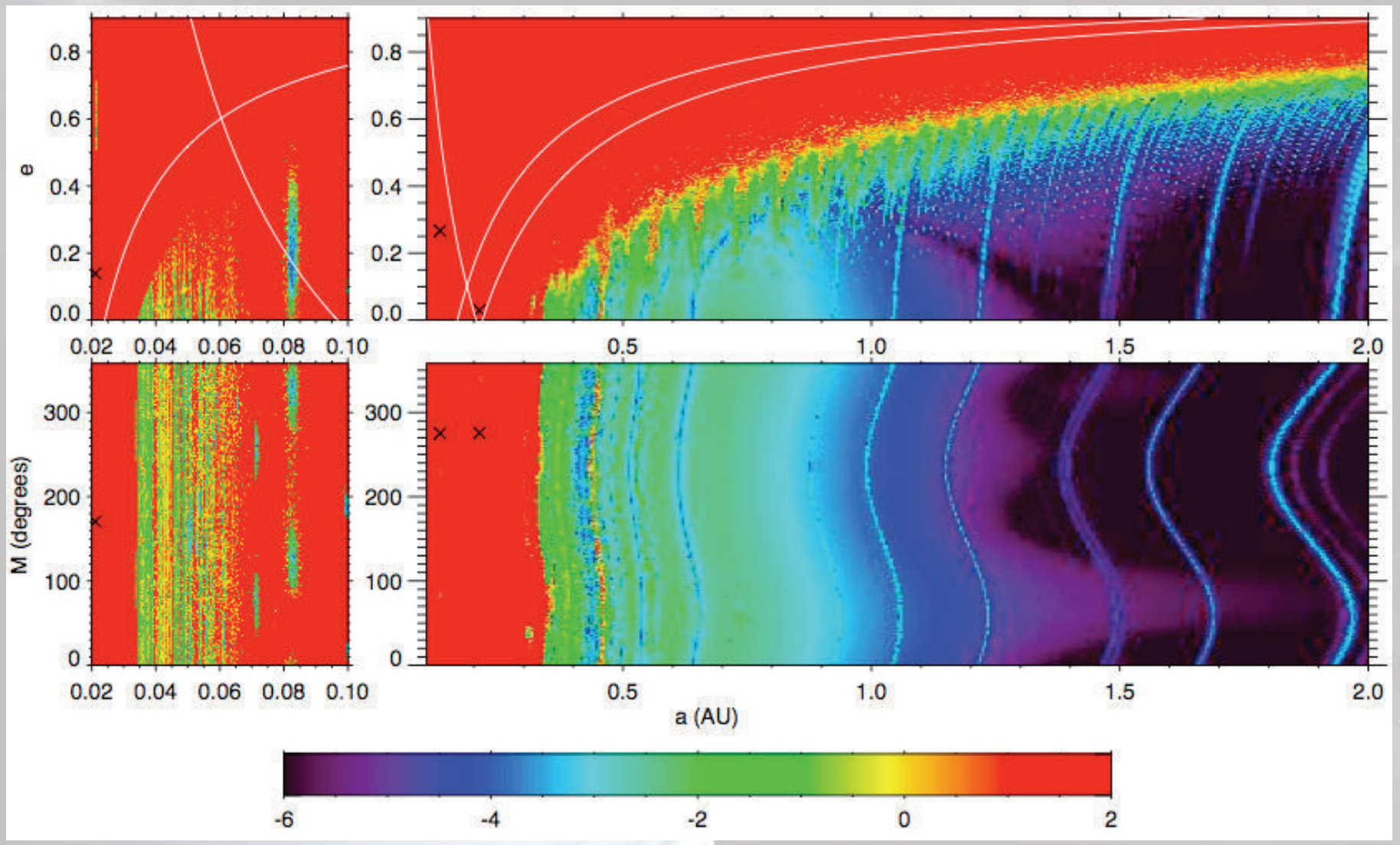
Correia et al., A&A, (2010)

3rd planet with 6 M_E



Correia et al., A&A, (2010)

Additional planets?



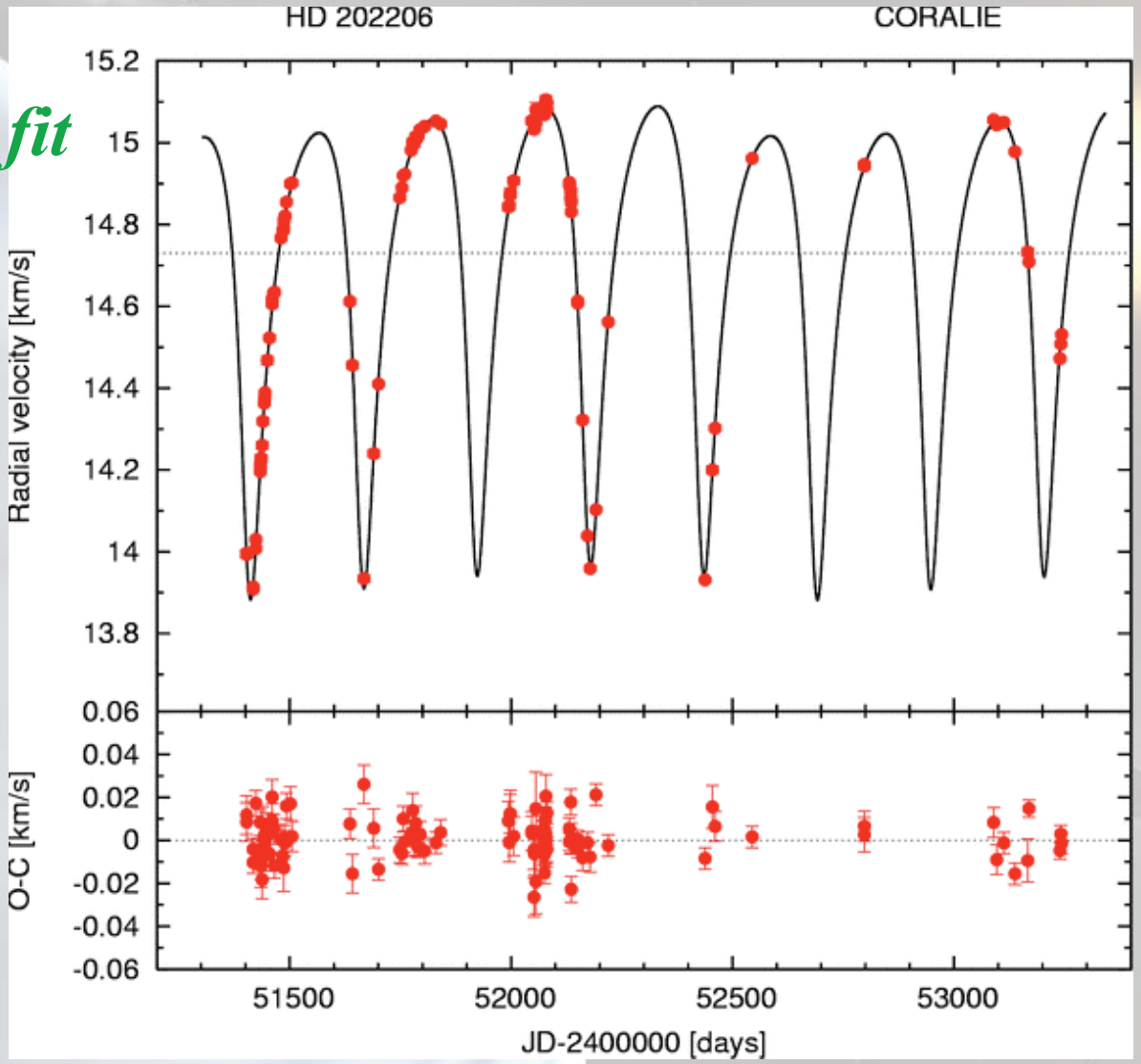
Correia et al., A&A, (2010)

HD202206 (5:1 resonance)

keplerian fit

χ^2=1.53

rms =
9.81 m/s

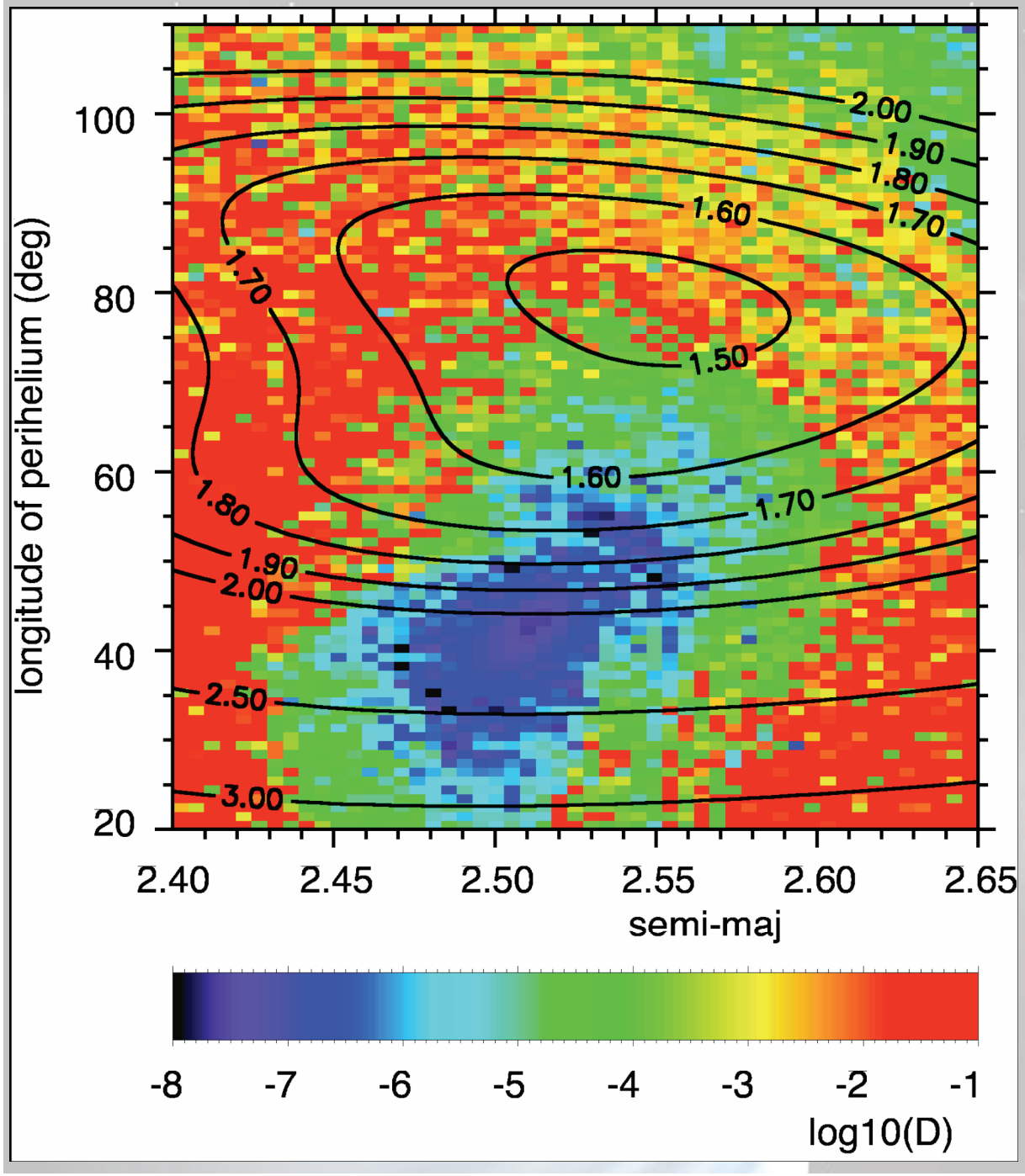


N-body fit

χ^2=1.47

rms =
9.65 m/s

Correia et al., A&A, (2005)



$a = 2.55$ AU

$\omega = 79.0^o$

$\chi^2 = 1.47$

rms = 9.65 m/s

$a = 2.54$ AU

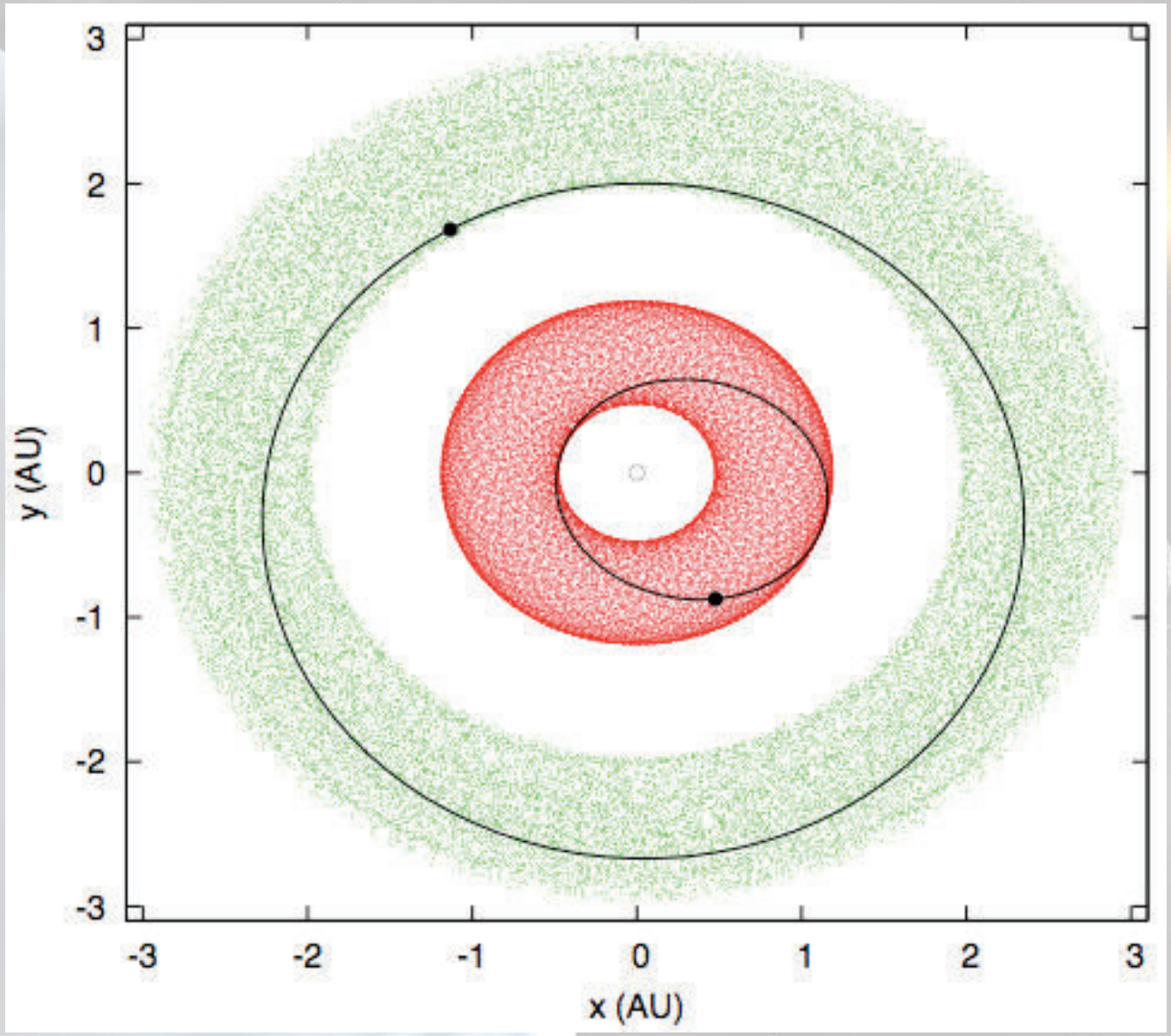
$\omega = 55.5^o$

$\chi^2 = 1.67$

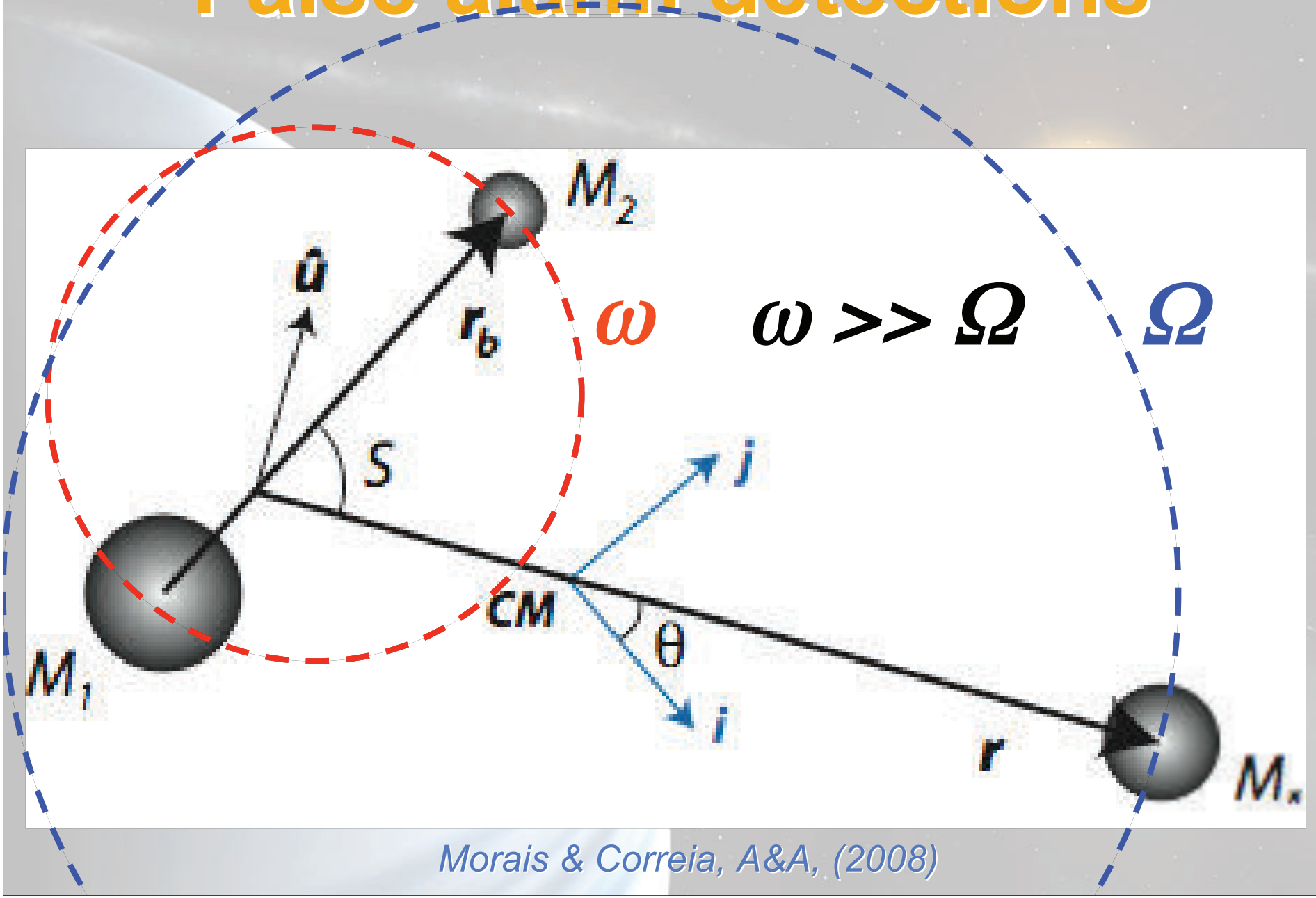
rms = 10.7 m/s

Correia et al., A&A, (2005)

Stability over 5 Gyr

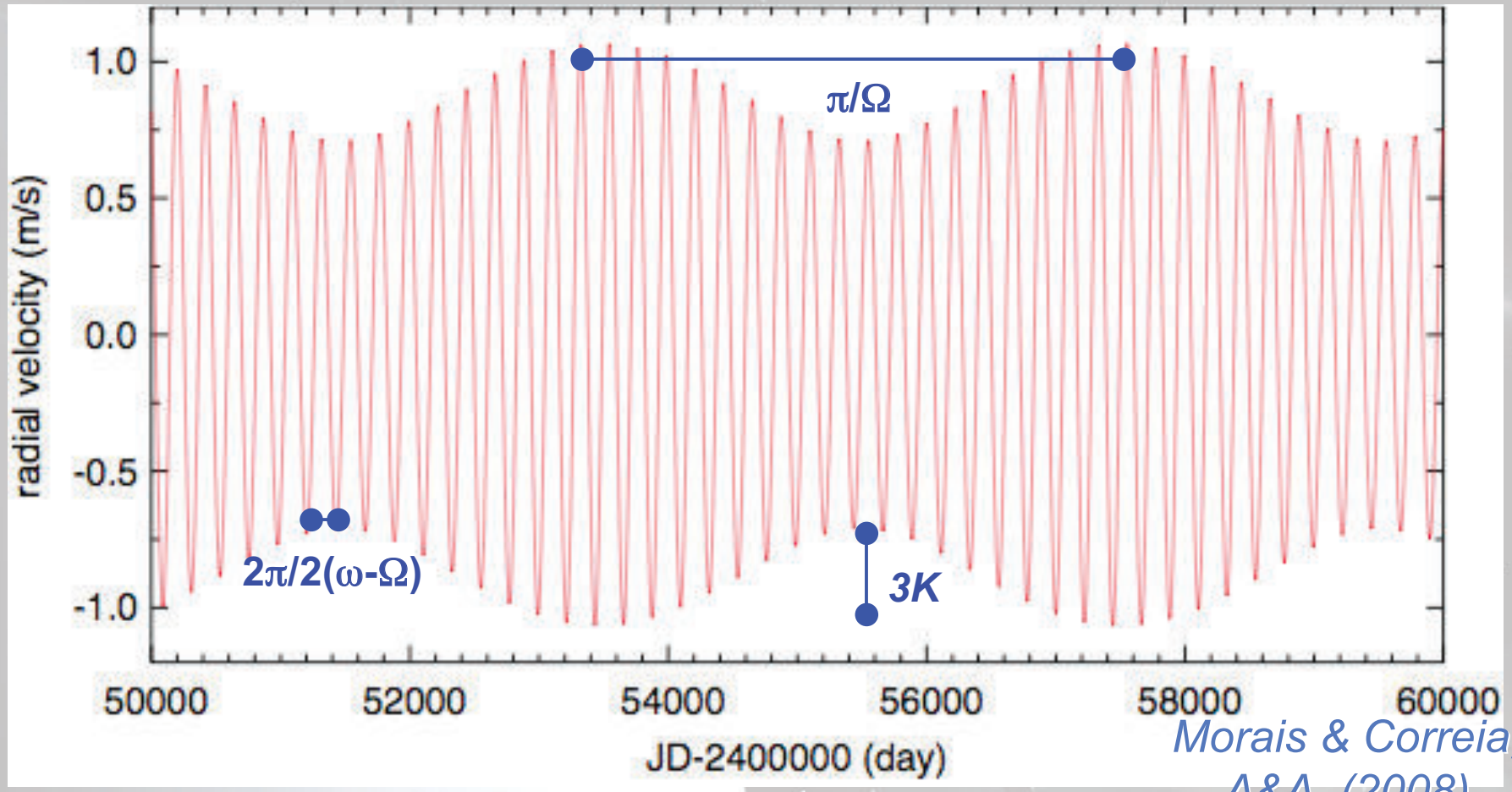


False alarm detections



Morais & Correia, A&A, (2008)

binary wobble



Morais & Correia, A&A, (2008)

$$V_b = K [\, 6 \cos(2(\omega-\Omega)t) \cos(\Omega t) + 9 \sin(2(\omega-\Omega)t) \sin(\Omega t) \,]$$

Expertises:

- N-body simulations, gravitational interactions, relativistic effects.
- Secular evolution of planetary systems.
- Geophysical effects on stars and planets (gravitational tides, atmospheric tides, core-mantle friction).
- Minimization of data generated by N-body systems.
- Numerical simulations (symplectic integrators, MPI parallel computing, etc.).