

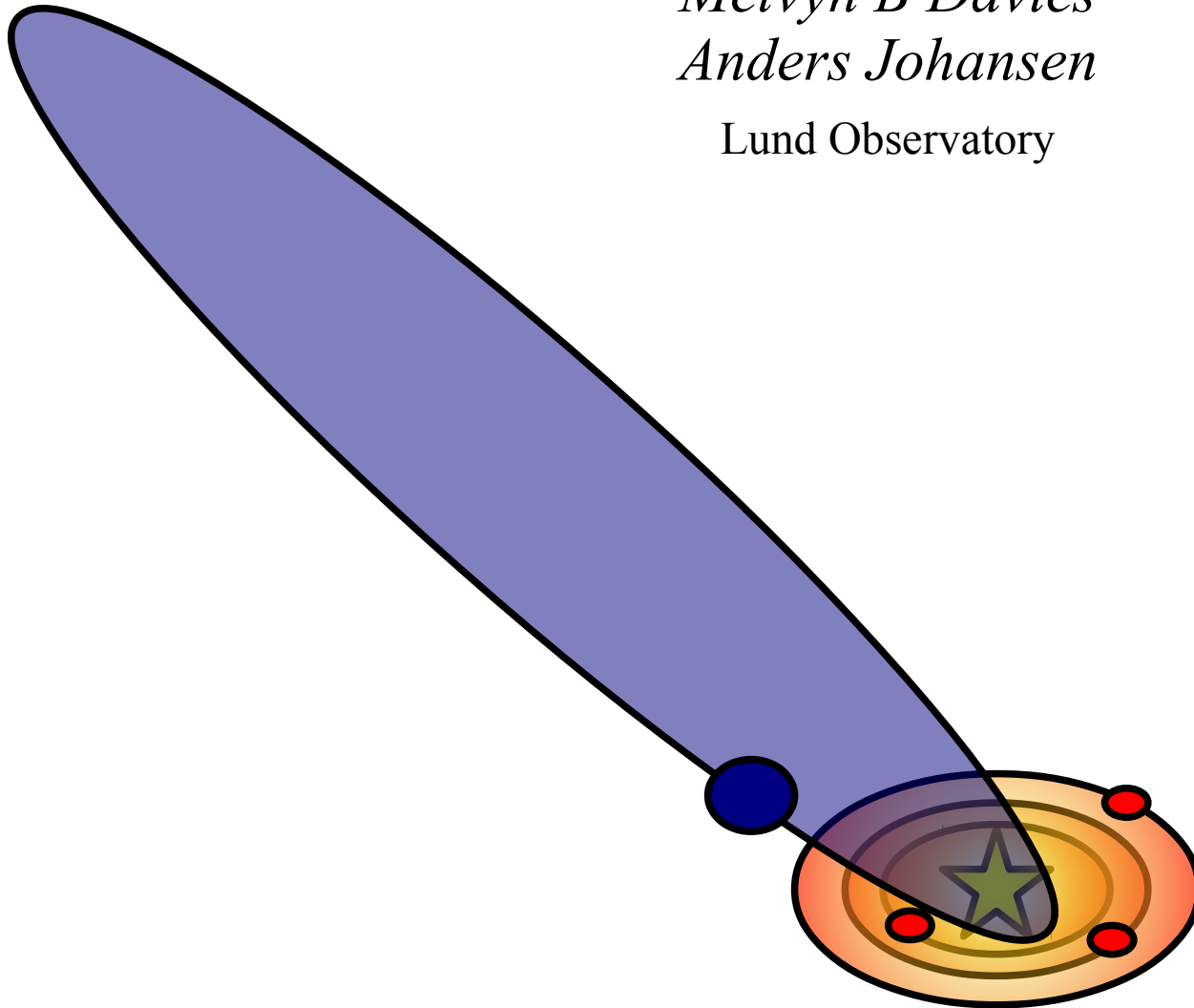
The destruction of inner planetary systems during the high-eccentricity migration of gas giants

Alexander James Mustill

Melvyn B Davies

Anders Johansen

Lund Observatory



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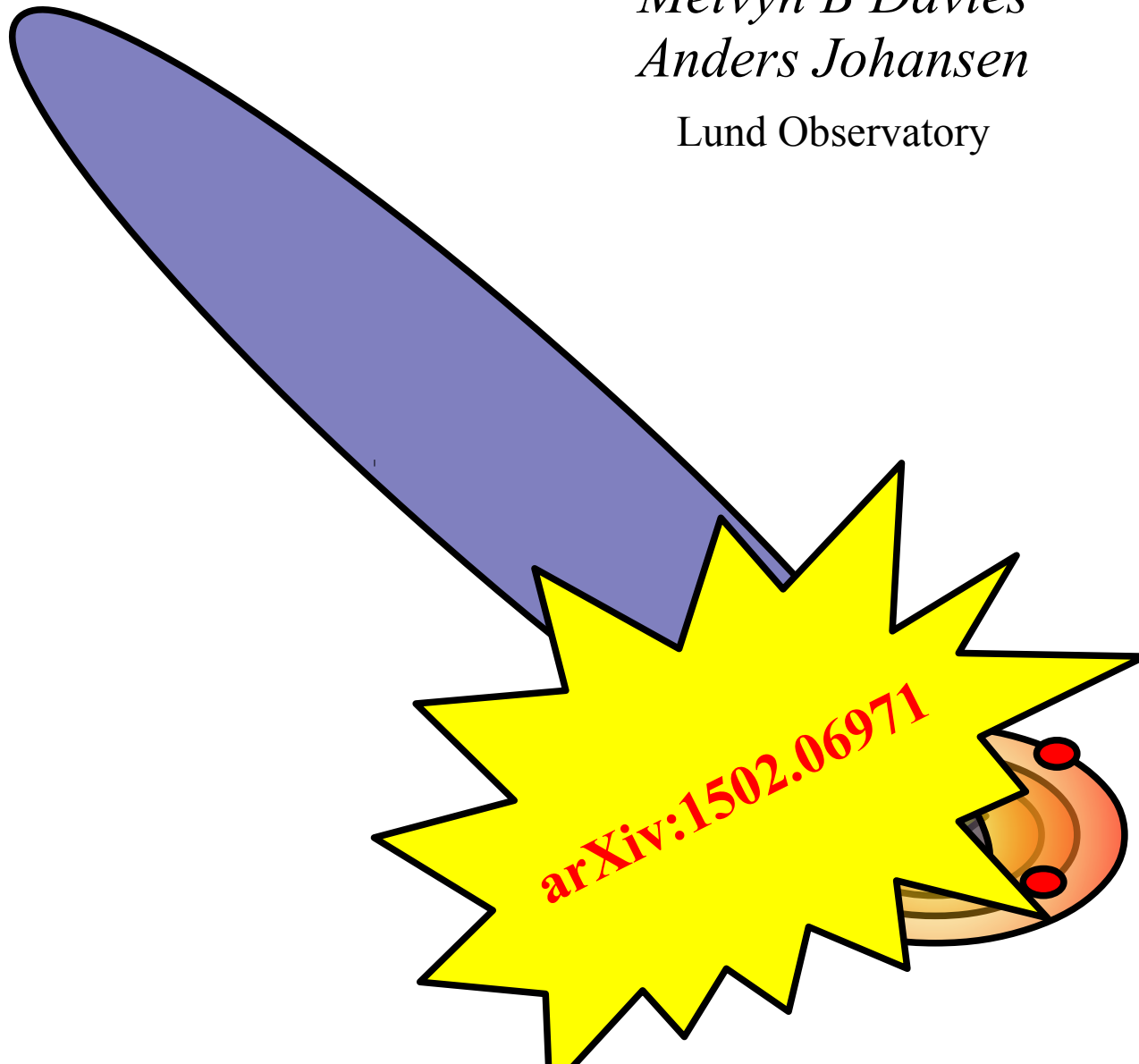
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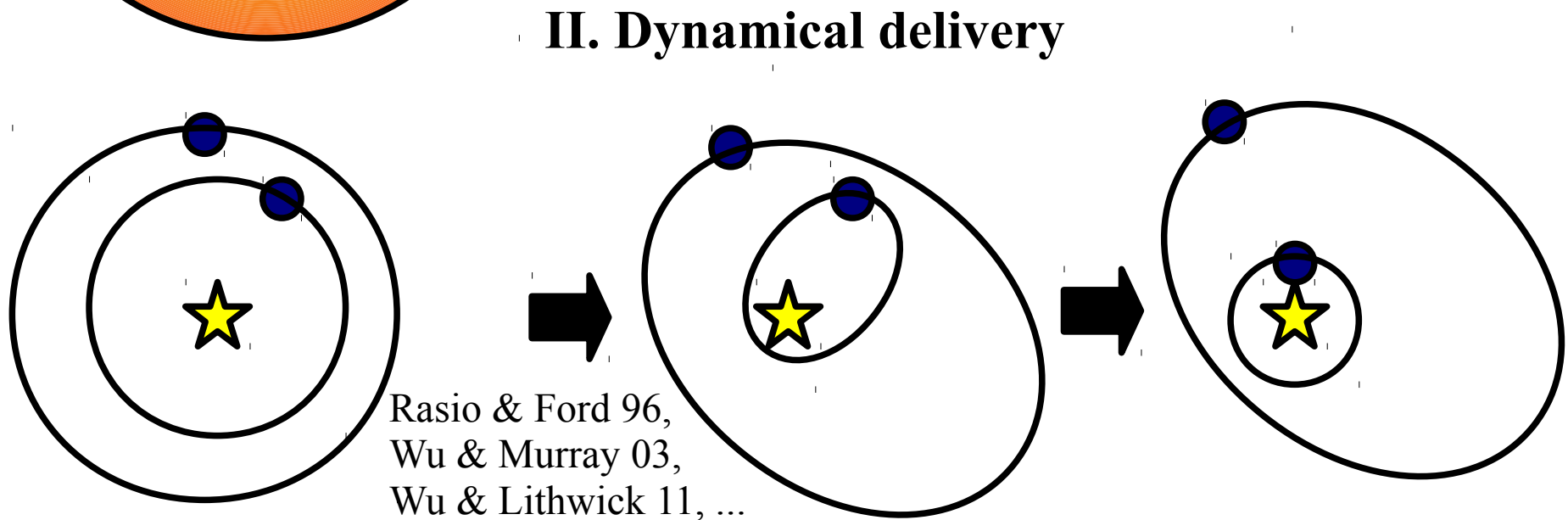
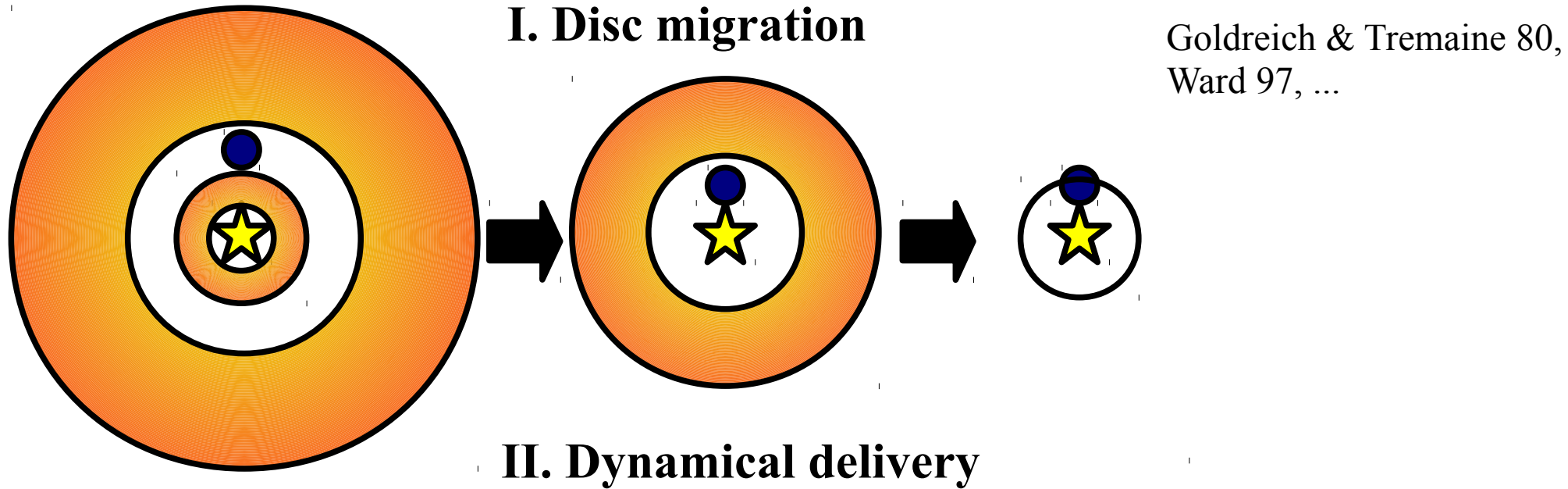
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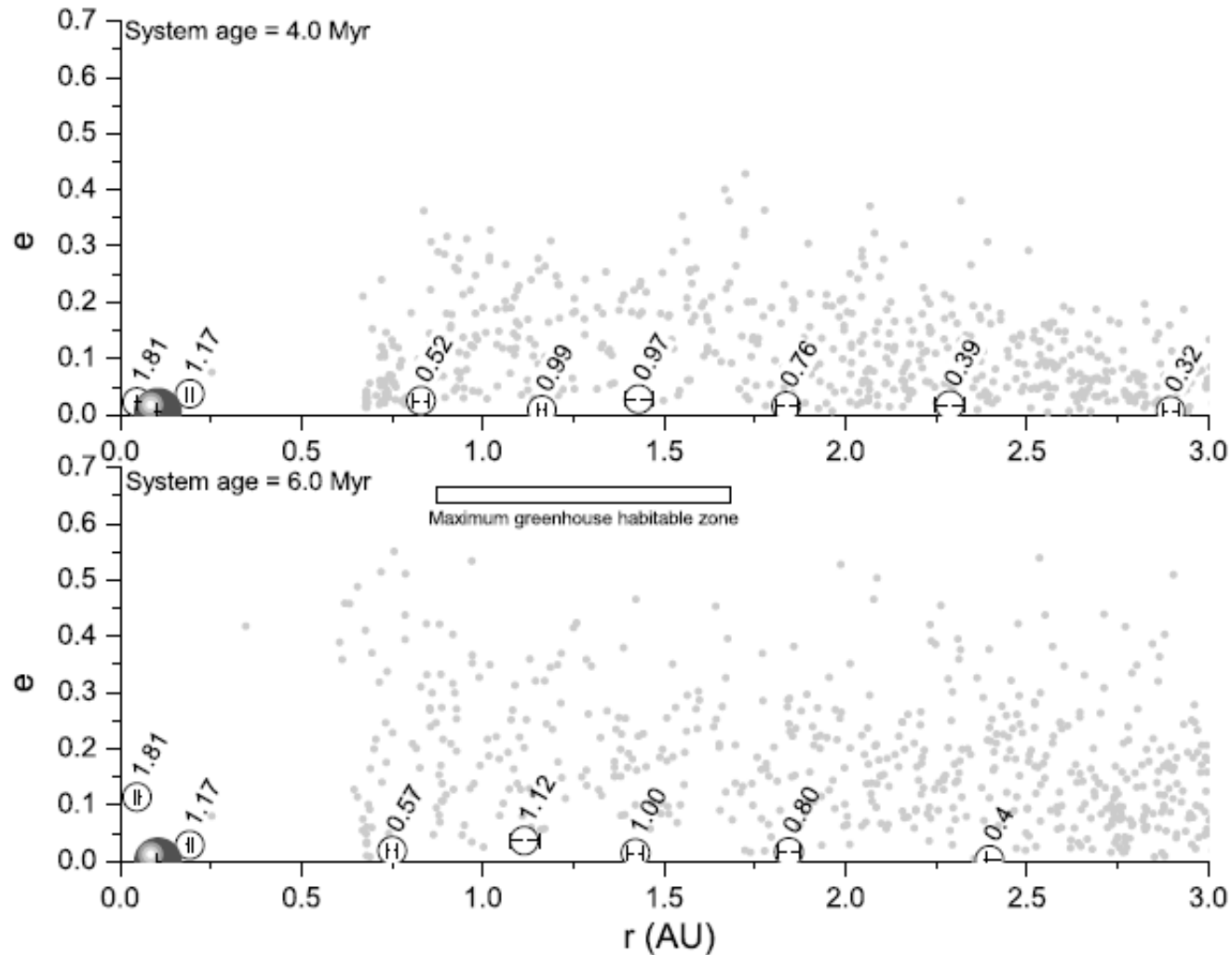


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Hot Jupiter formation pathways

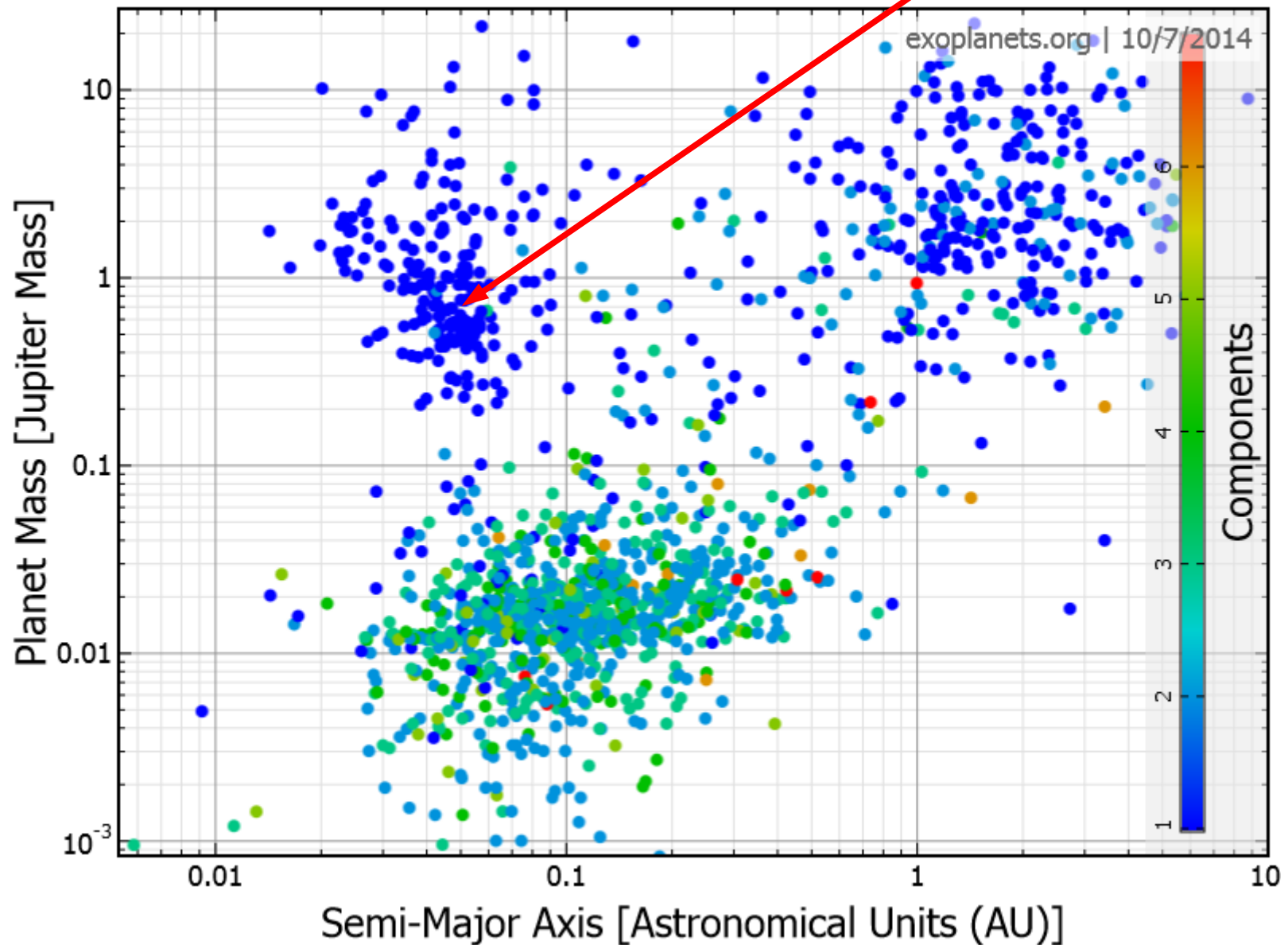


Disc migration does not destroy/ prevent formation of other planets

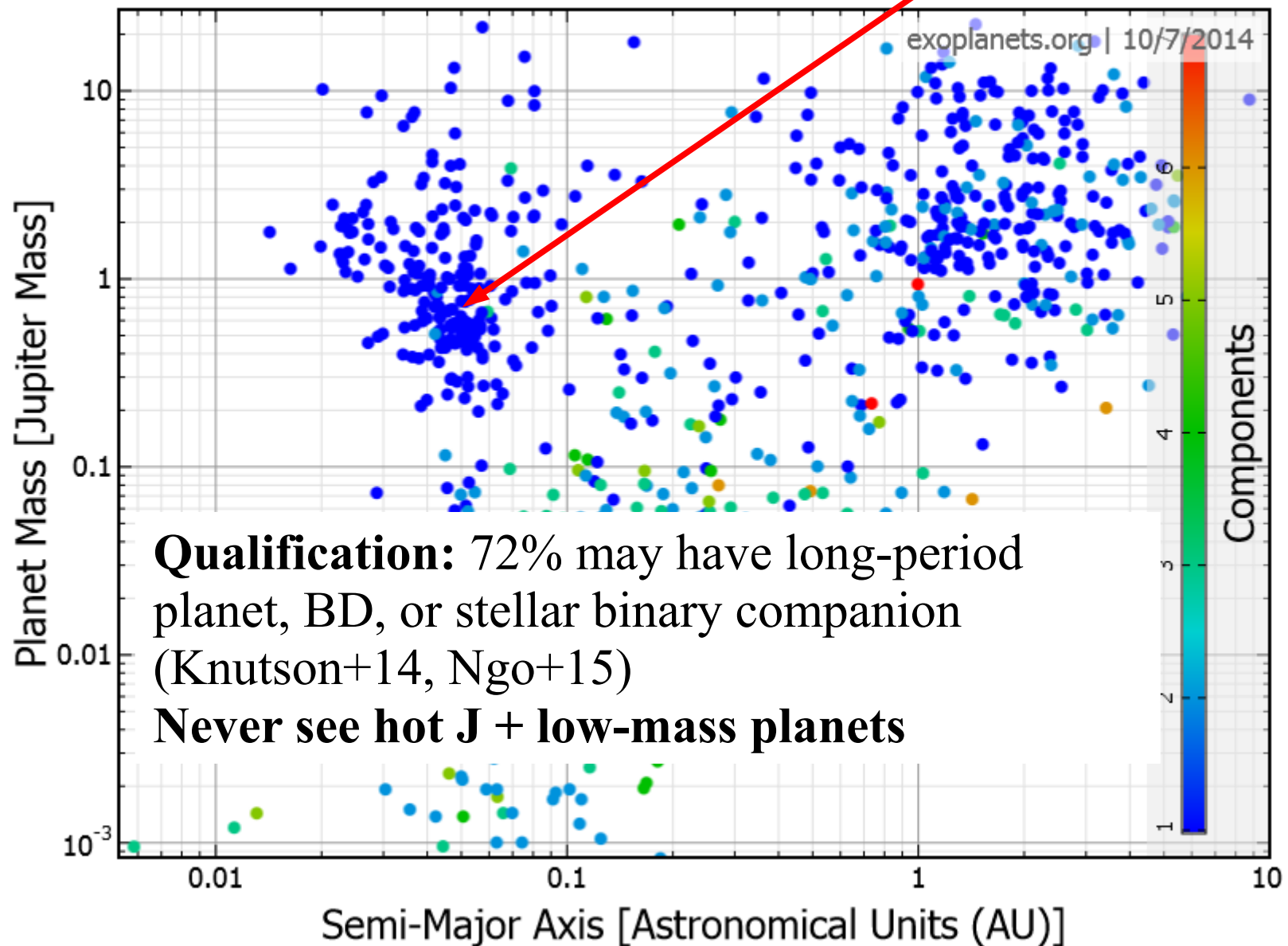


Fogg & Nelson 07

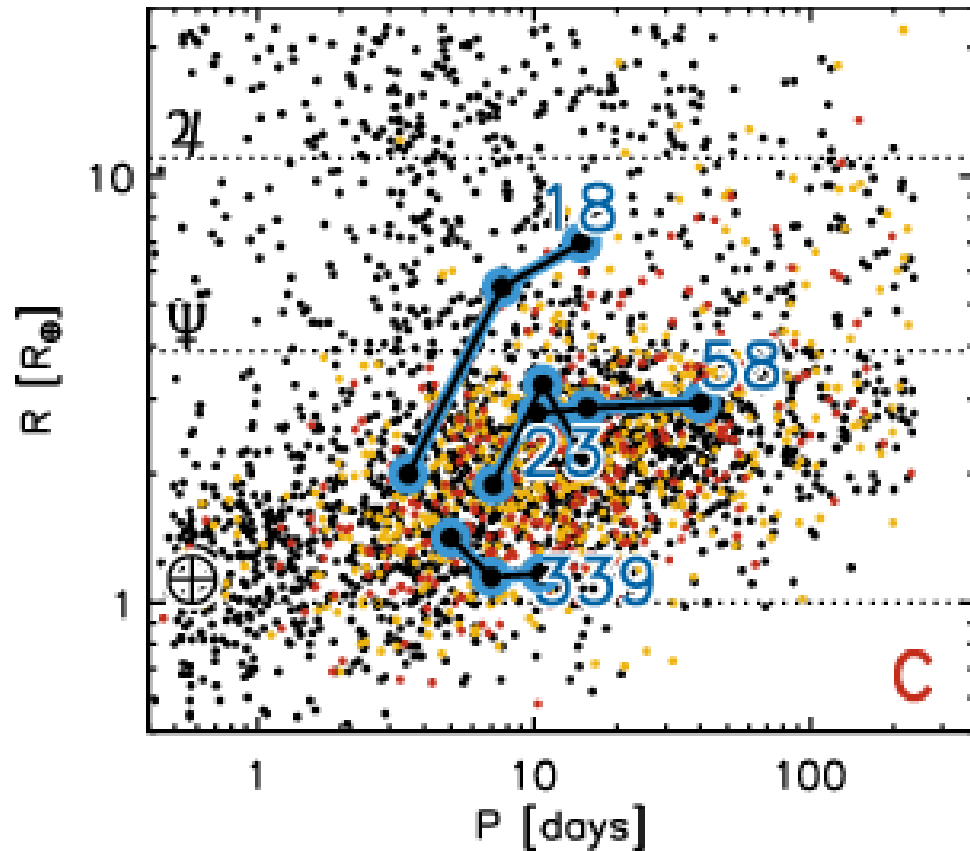
Hot Jupiters are (mostly) single



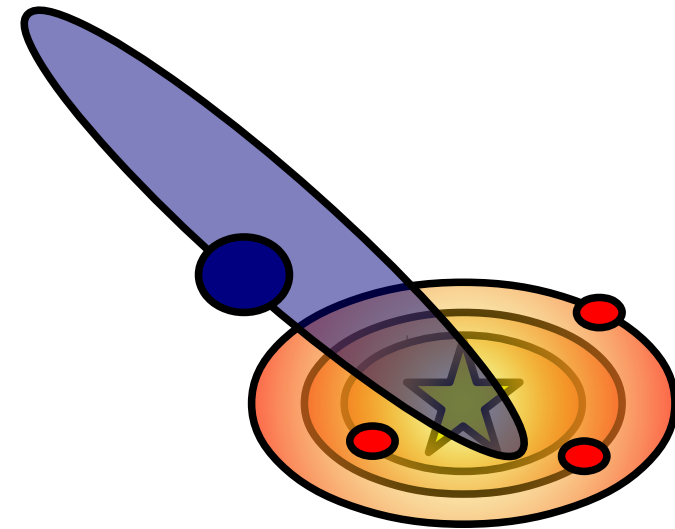
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Testing effects of dynamical Hot Jupiter delivery on systems of low-mass planets

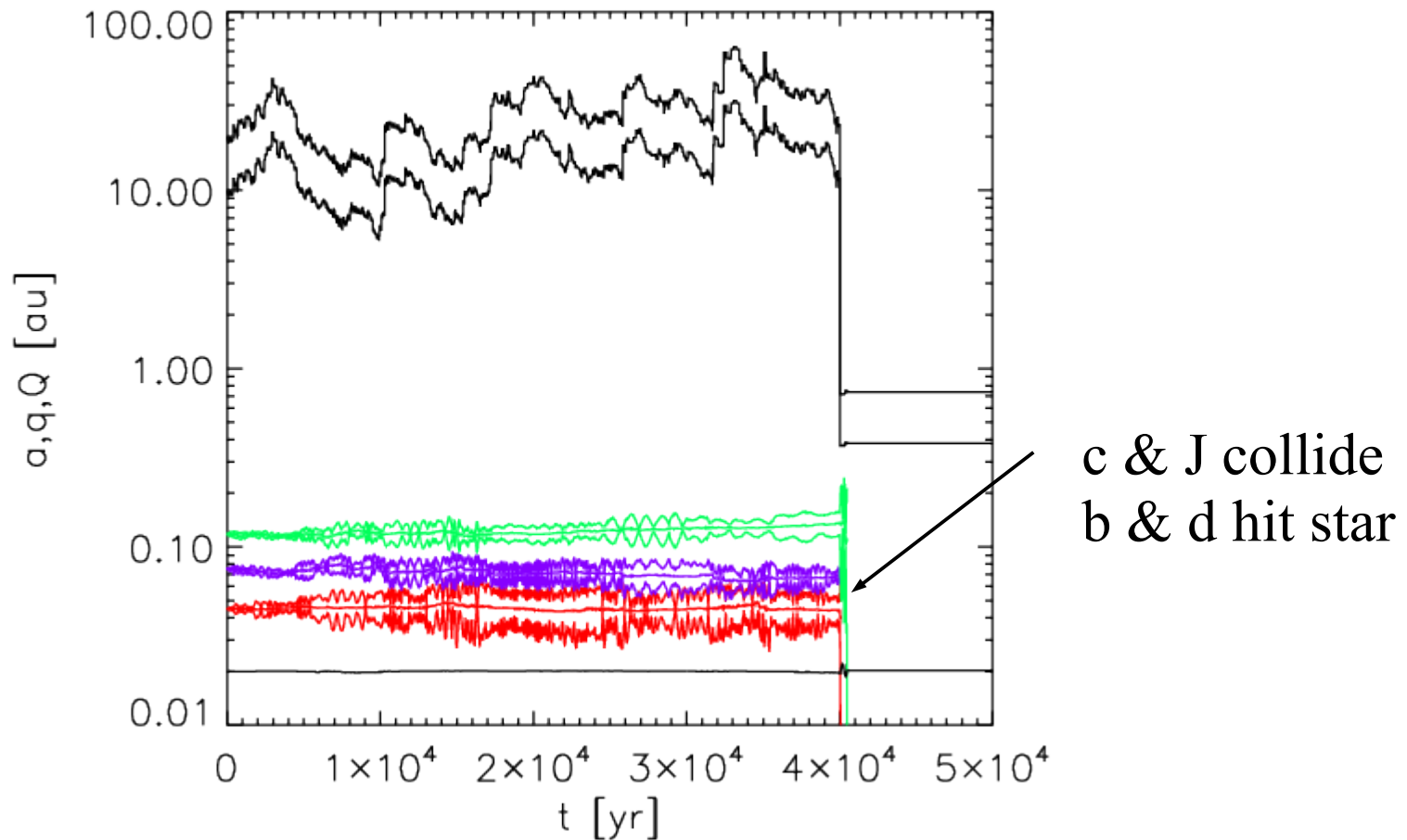


Take some representative *Kepler* triple-planet systems....



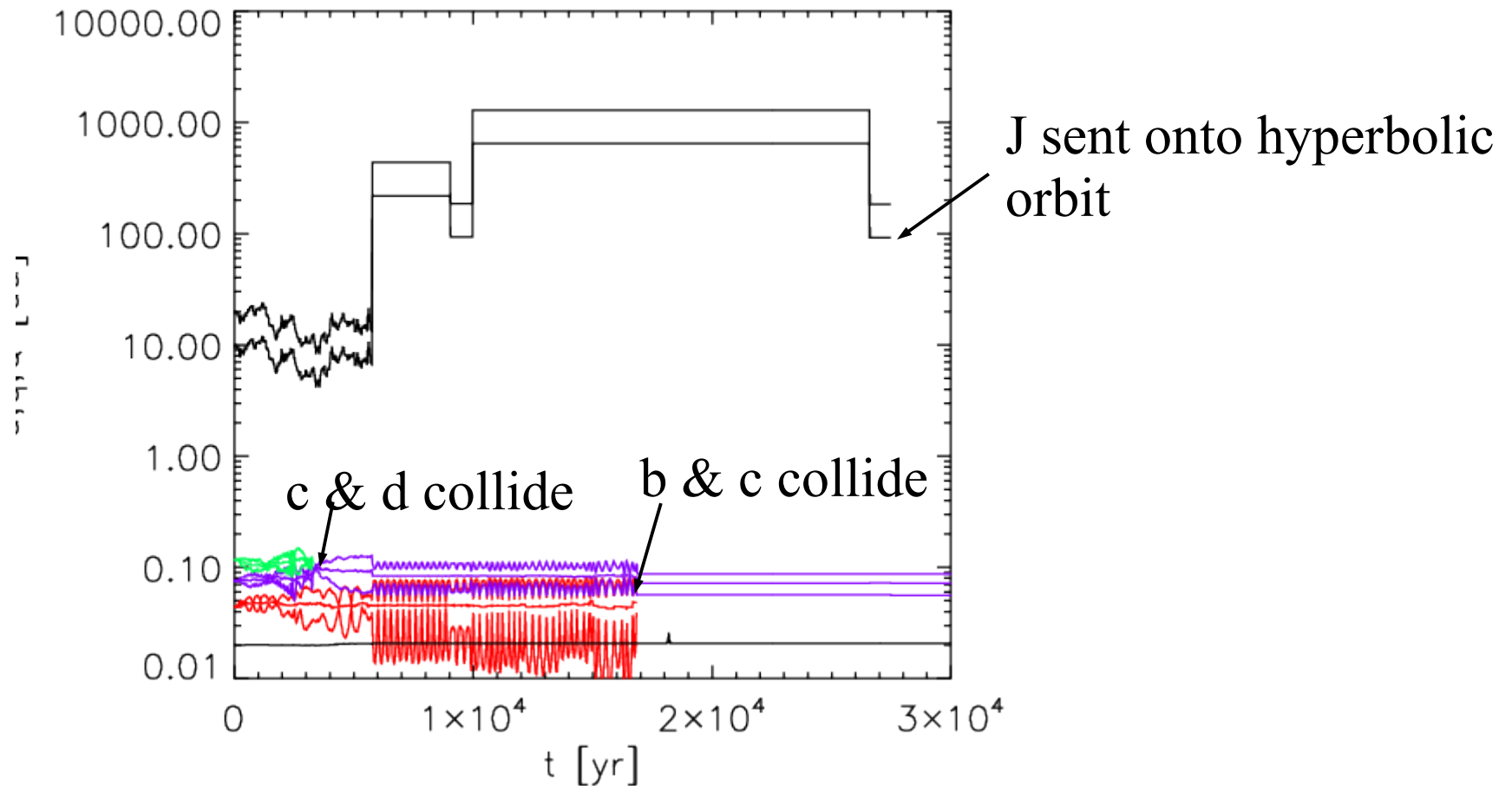
... and throw eccentric, inclined Jupiters at them (Mustill, Davies & Johansen, ApJ, submitted)

Example evolution I: Jupiter destroys inner planets



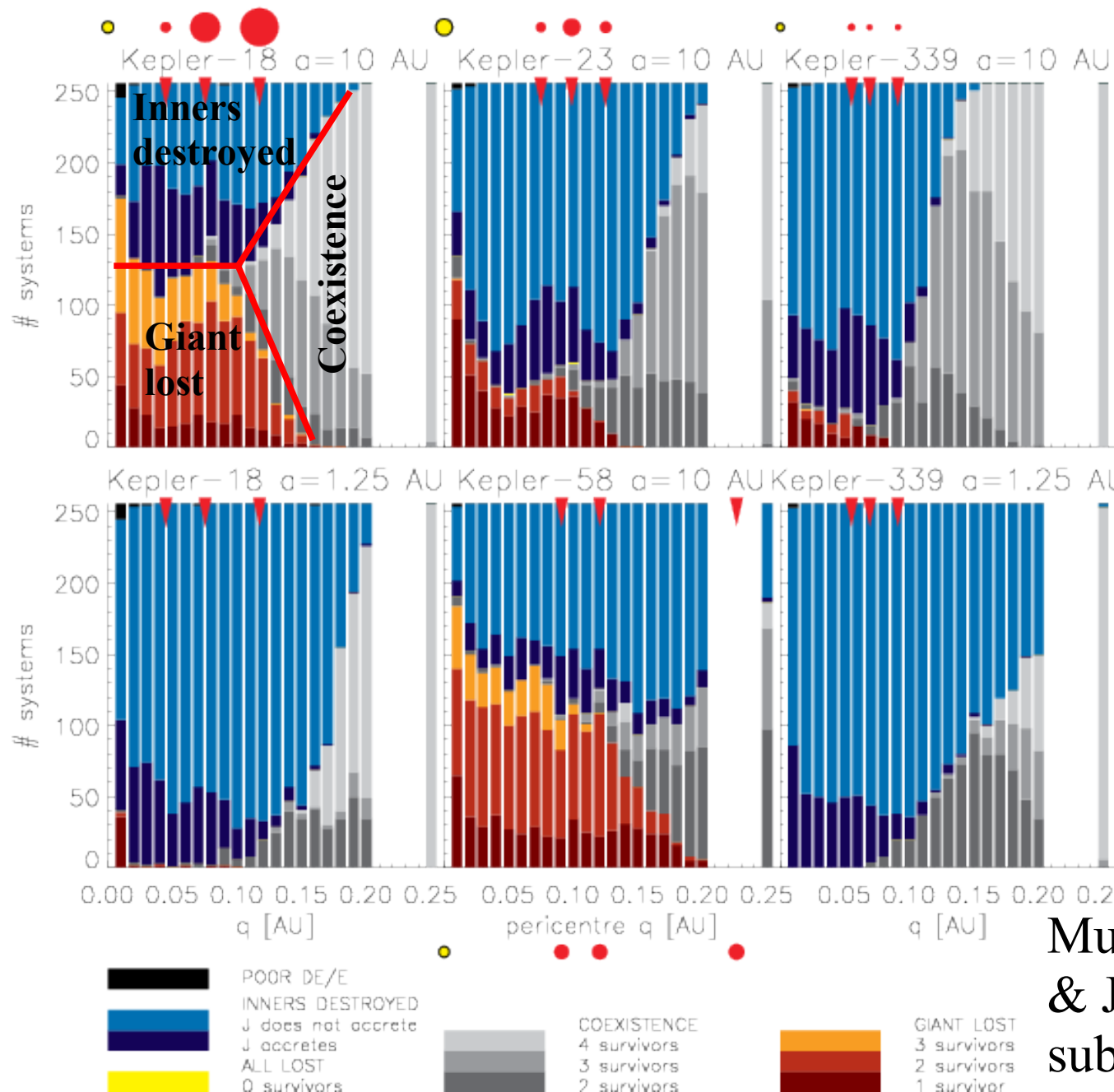
Mustill, Davies, & Johansen,
ApJ, submitted

Example evolution II: Jupiter ejected



Mustill, Davies, & Johansen,
ApJ, submitted

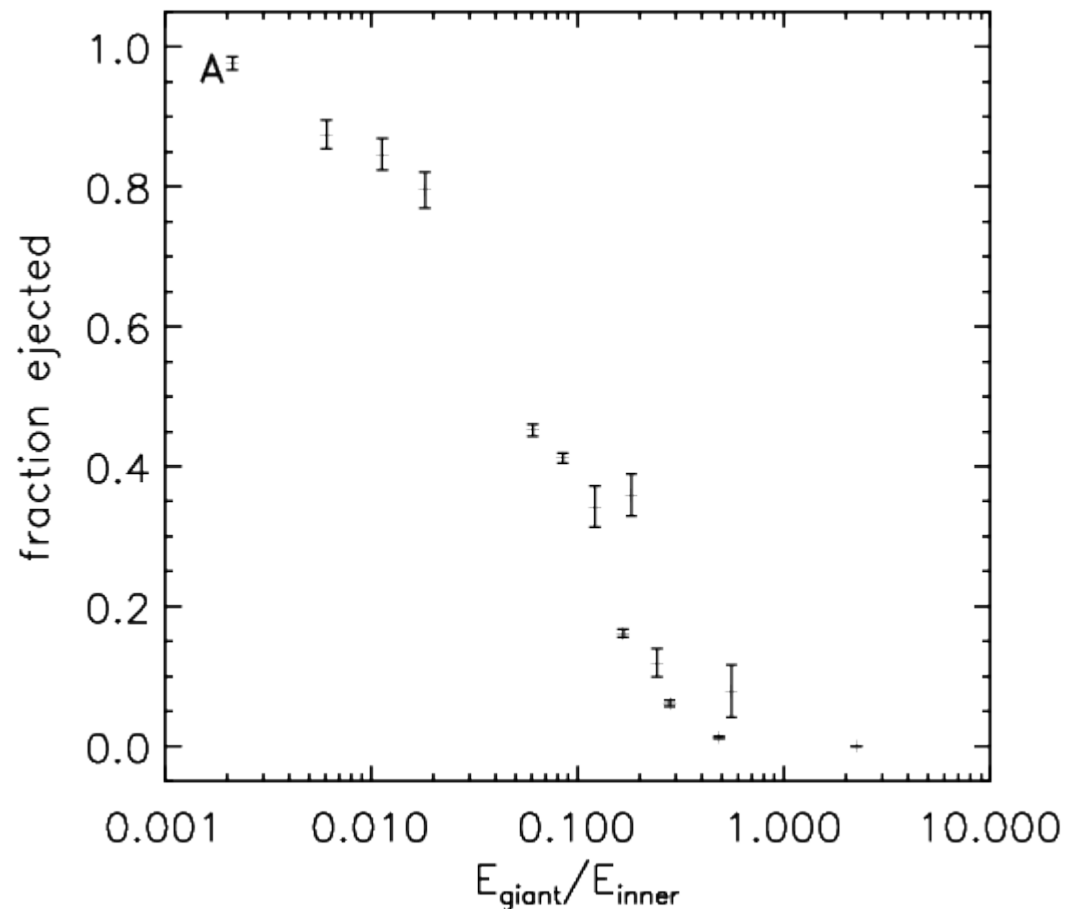
Destruction of inner planets or ejection of Jupiter?



Mustill, Davies,
& Johansen, ApJ,
submitted

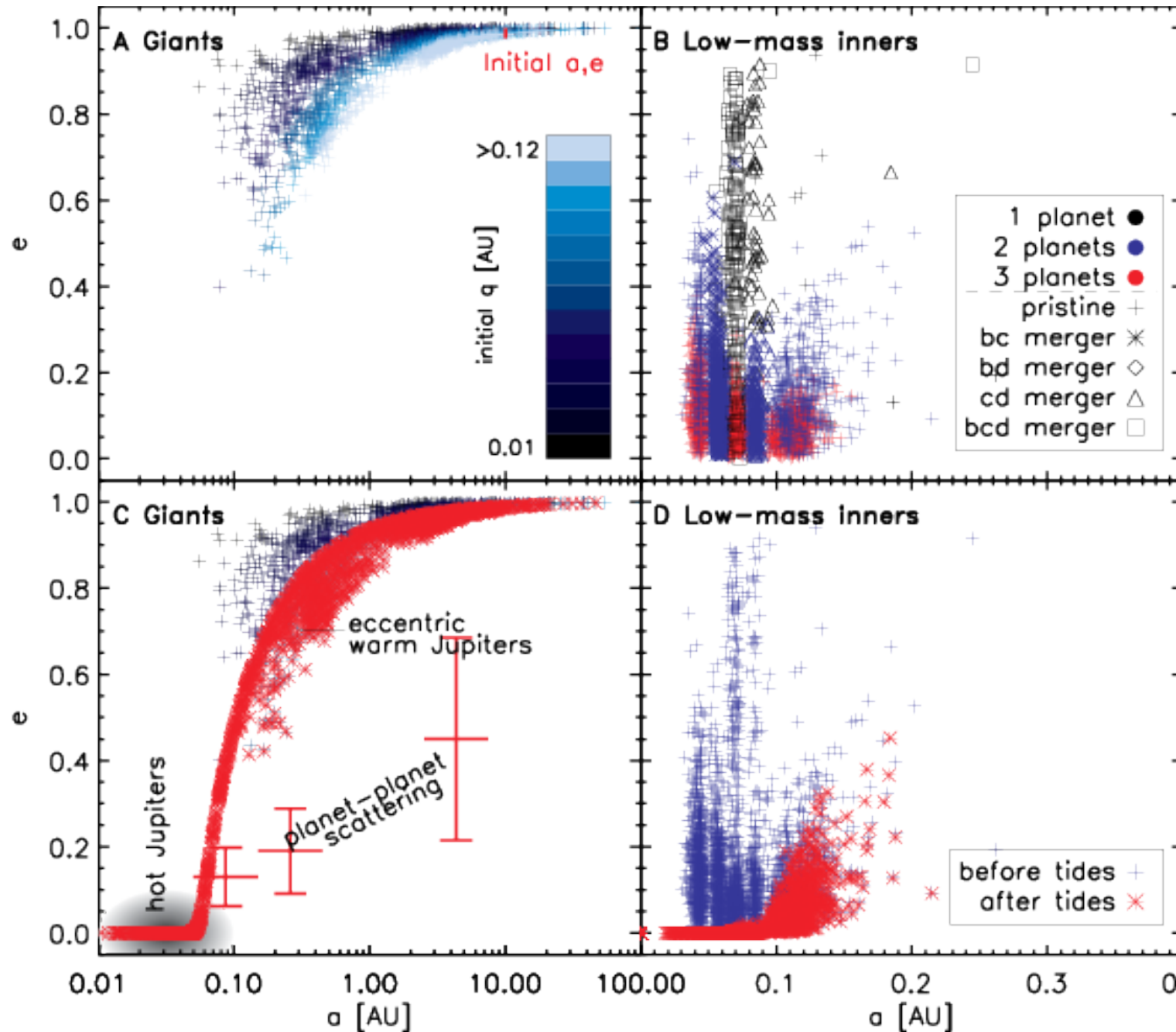
Effects of Energy

- Chance of ejecting the Jupiter depends on relative orbital energies of the giant and the inner planets



Mustill,
Davies, &
Johansen,
ApJ,
submitted

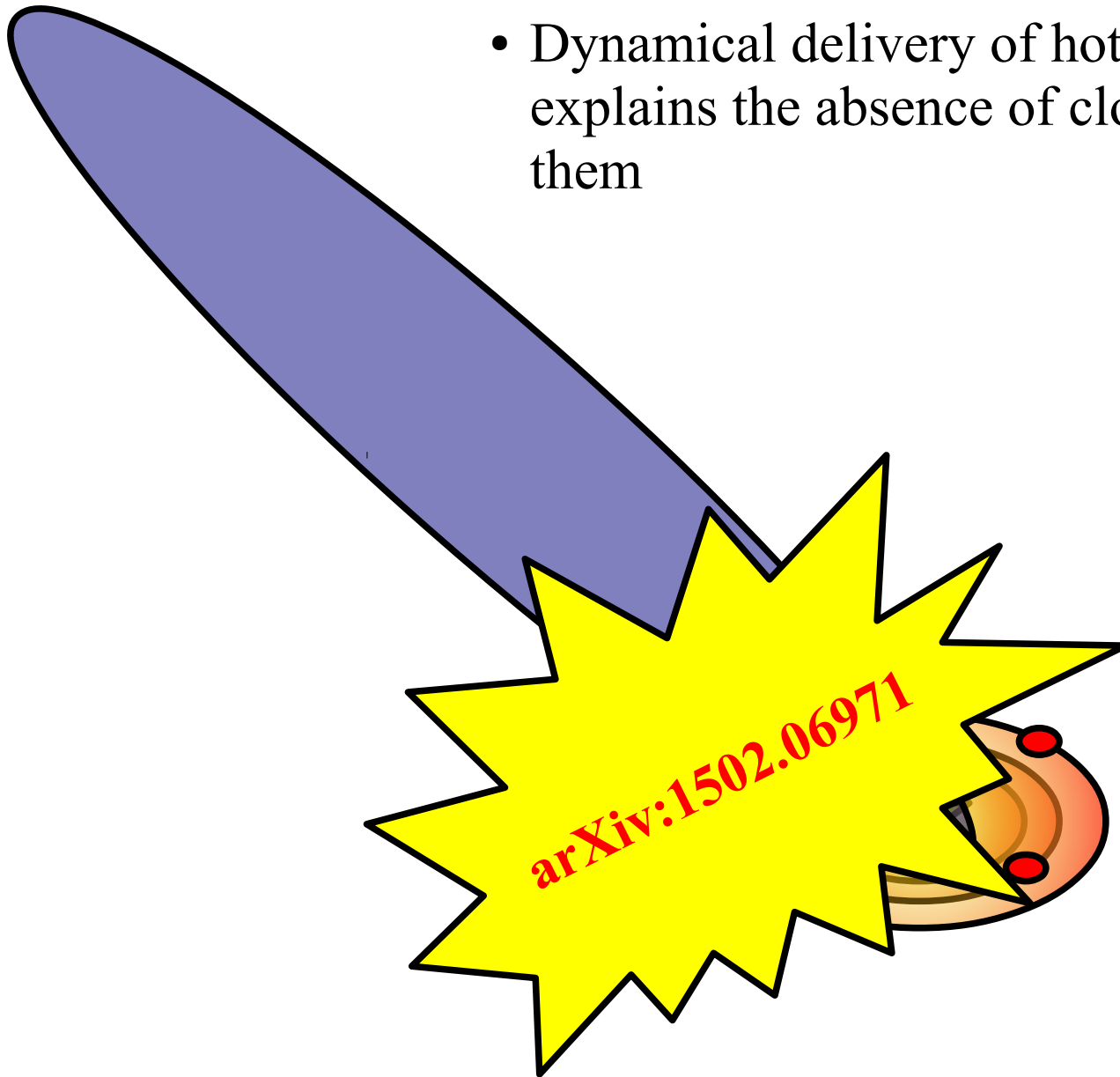
Final orbital elements



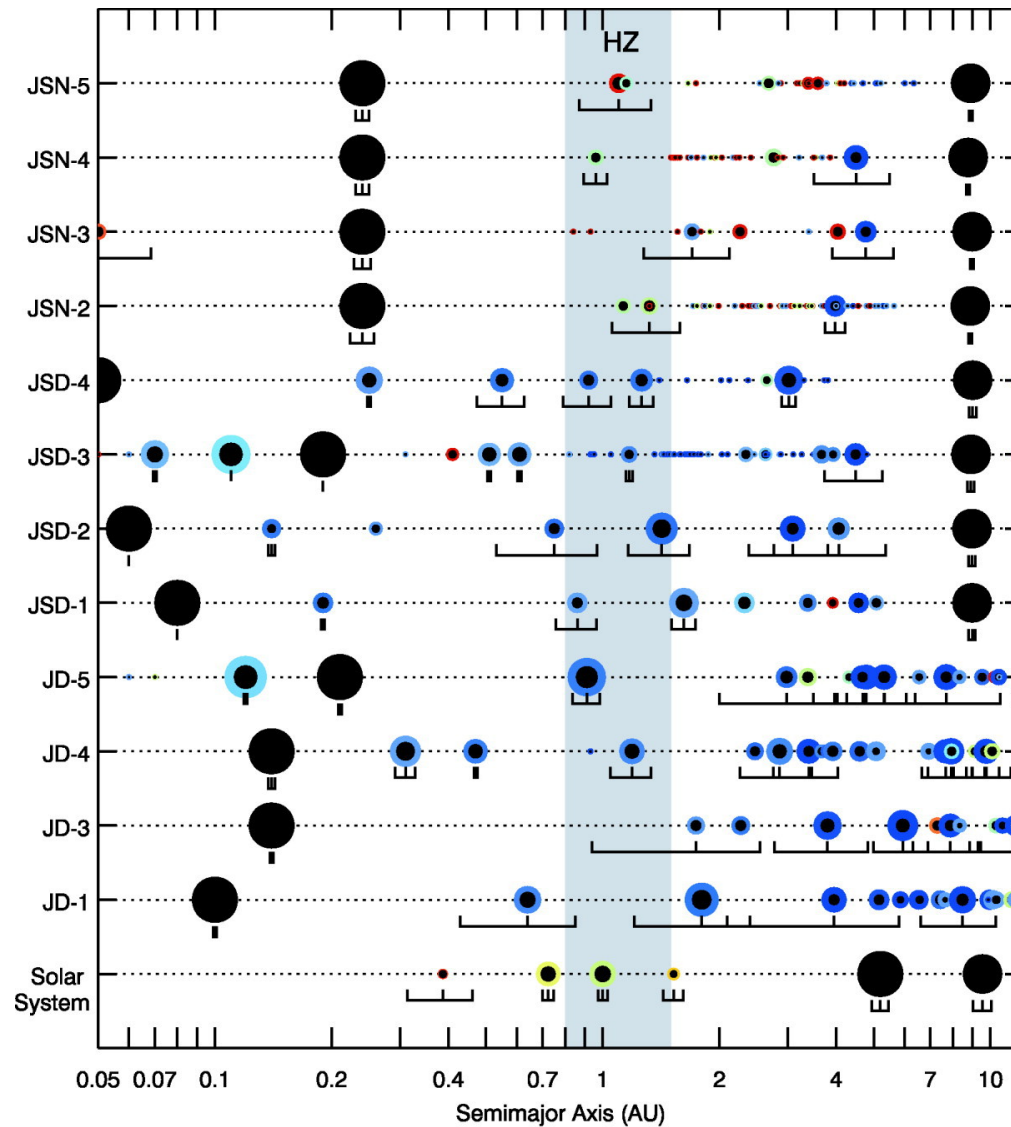
Mustill,
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 ApJ,
 submitted

Conclusion

- Dynamical delivery of hot Jupiters naturally explains the absence of close companions to them

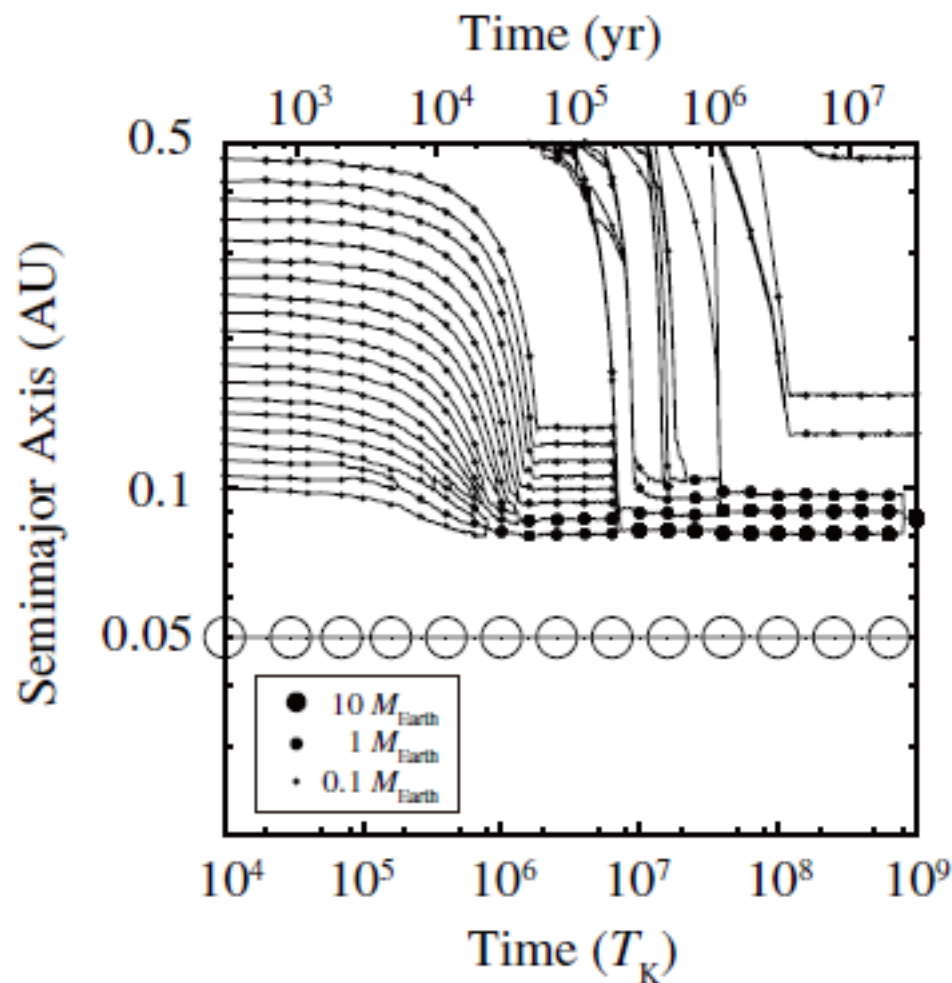


Disc migration does not destroy/ prevent formation of other planets



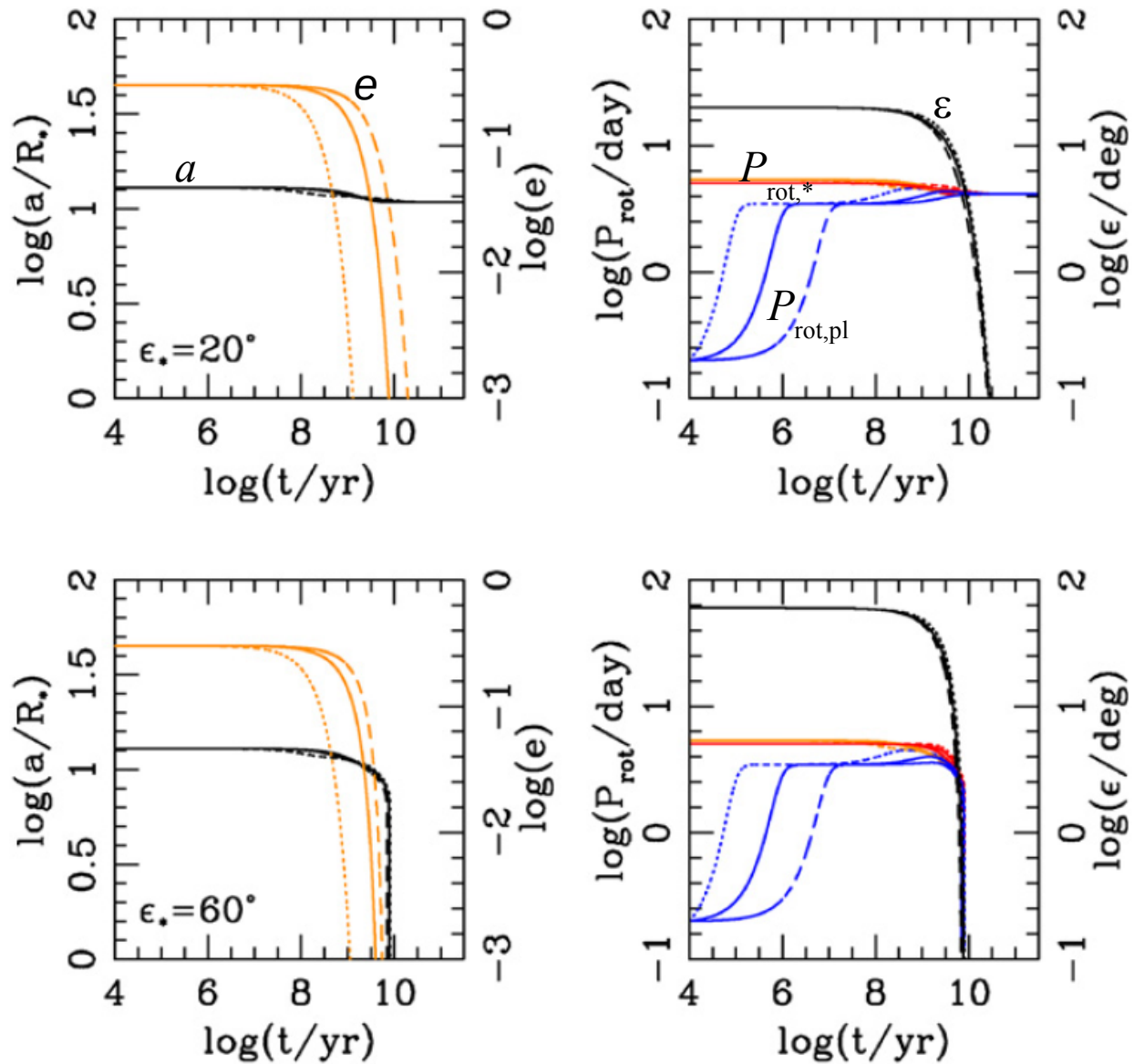
Mandell+07

Migration of embryos behind Hot Jupiter creates chains of low-mass planets



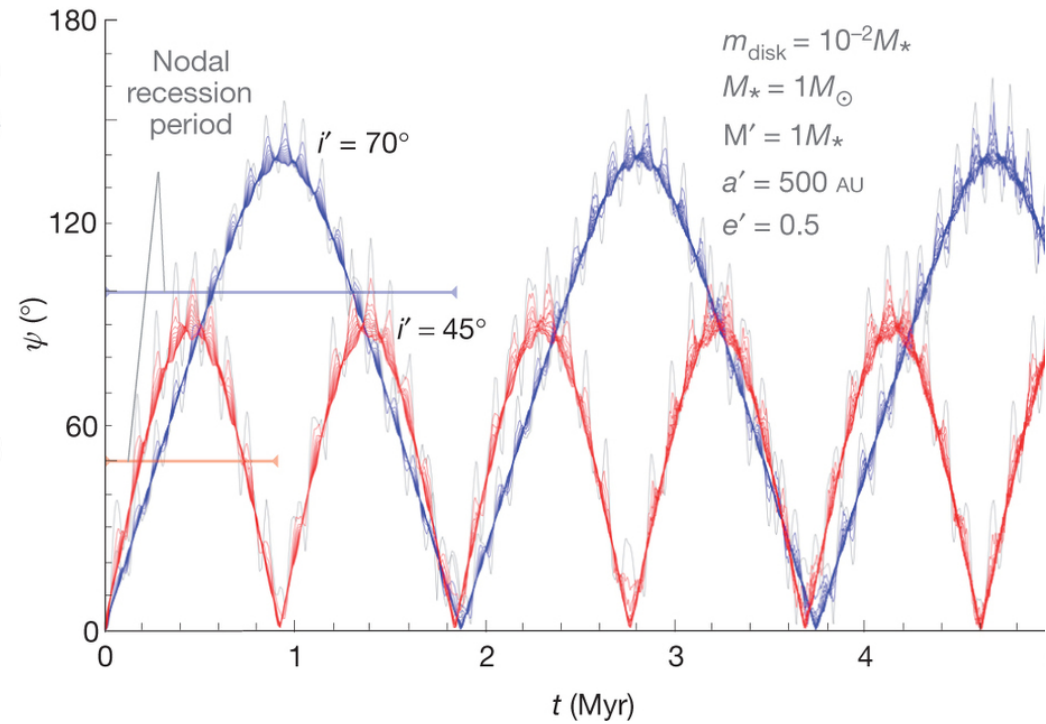
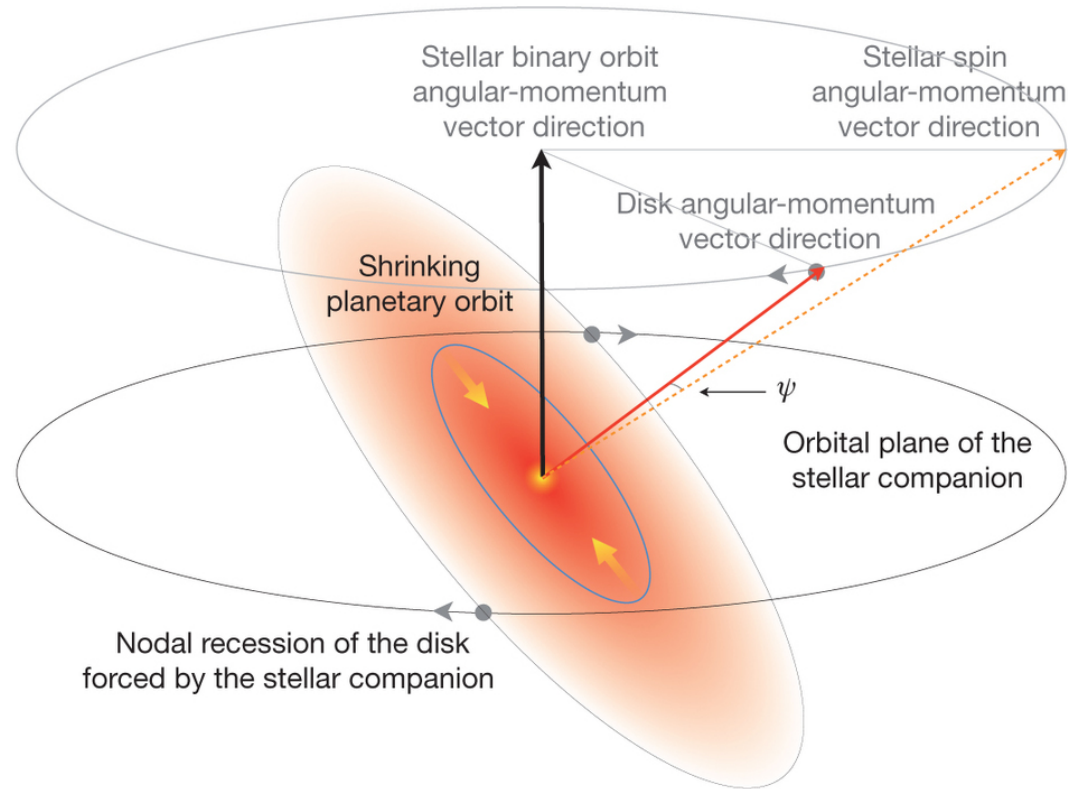
Ogihara+14

Example of tidal evolution



Matsumura+10

Misaligning a primordial disc



Batygin 12