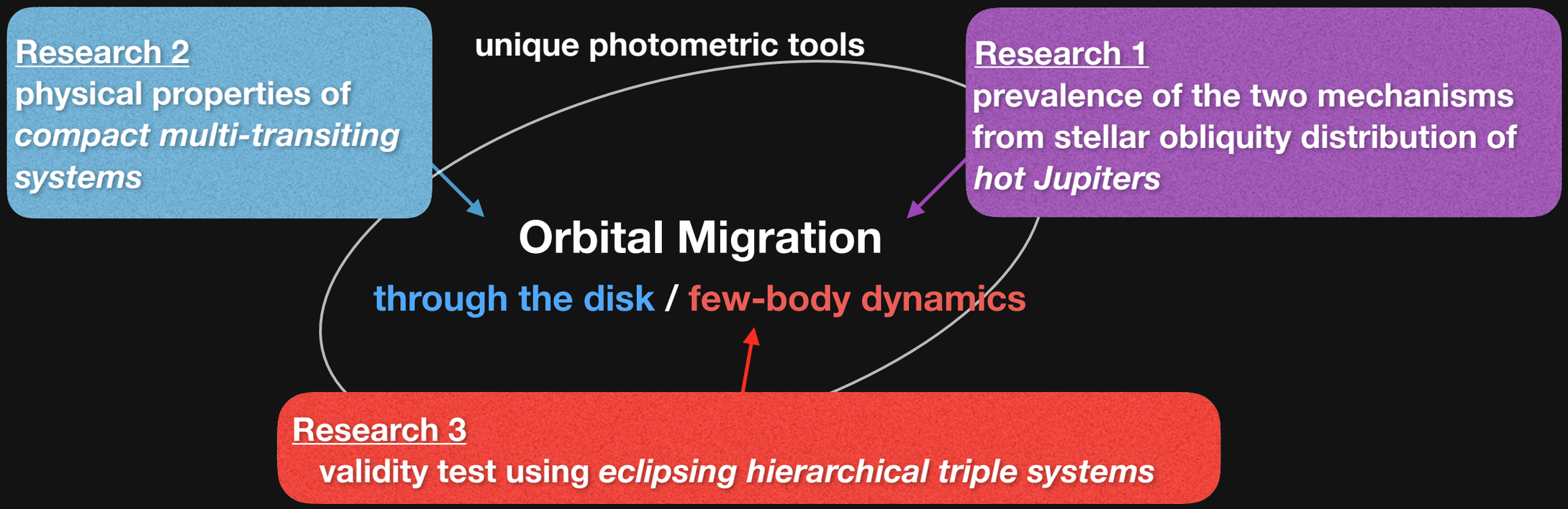
Toward a comprehensive view of planet formation and evolution: probing the role of orbital migration in explanatory systems from their observed architecture



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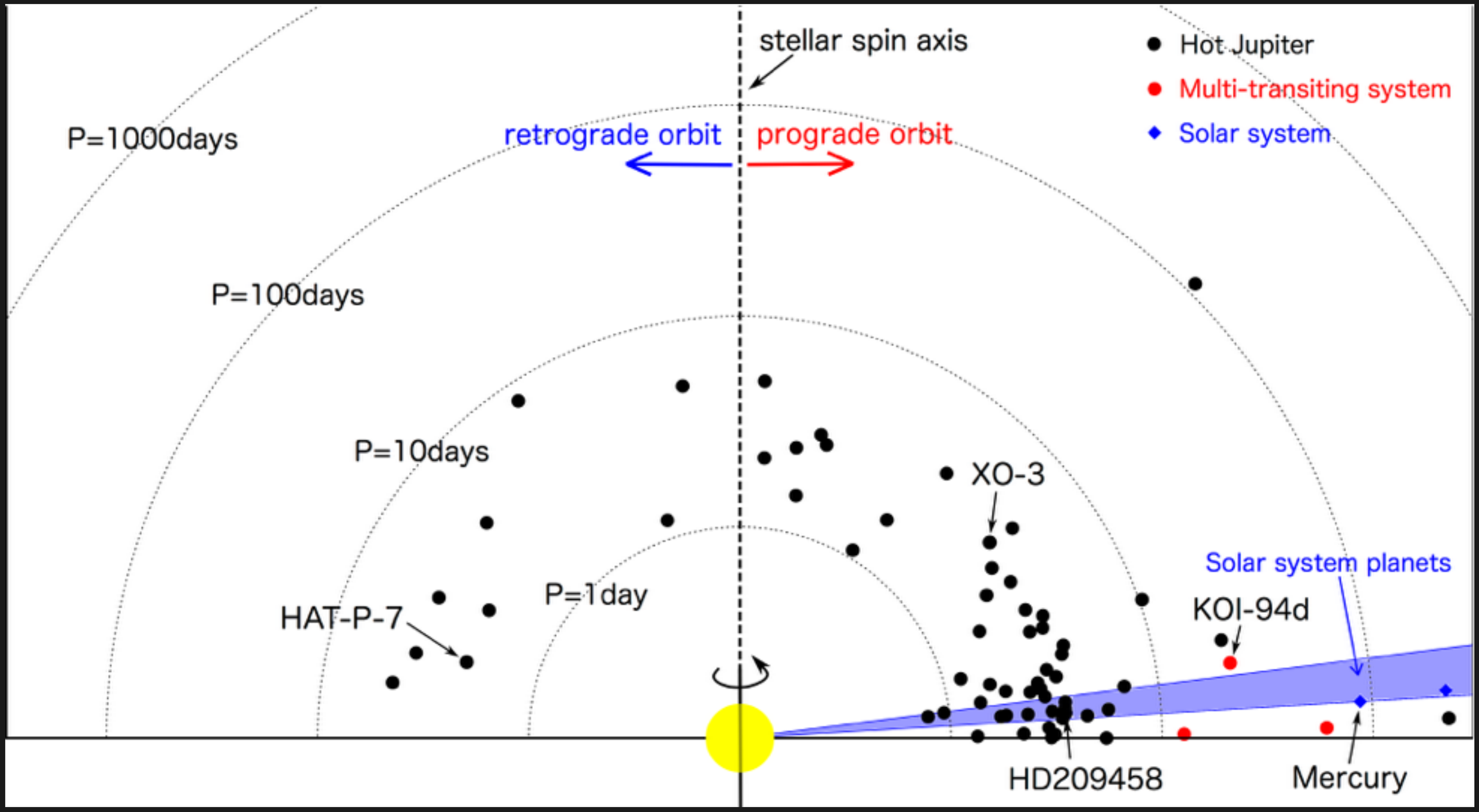
Spin-orbit misalignment in exoplanetary systems

The *planetary orbit* and *host-star rotation* are frequently misaligned in exoplanetary systems



Xue et al. (2014)

Origin of the spin-orbit misalignment: Nature or nurture?

1. Misalignment as an initial condition

protoplanetary disk already misaligned with the stellar spin

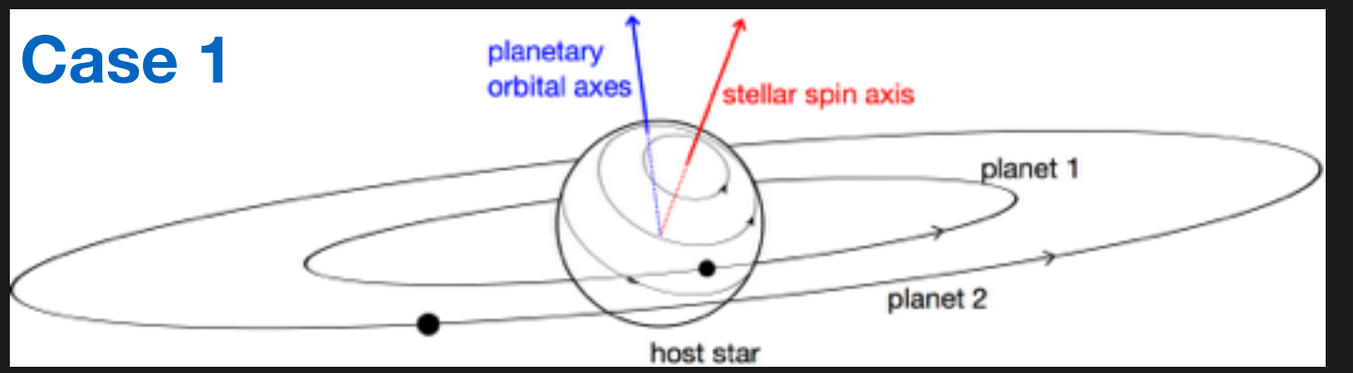
—> orbits of multiple planets (if exist) are mutually aligned; ***only stellar spin is misaligned***

2. Misalignment acquired through dynamical evolution

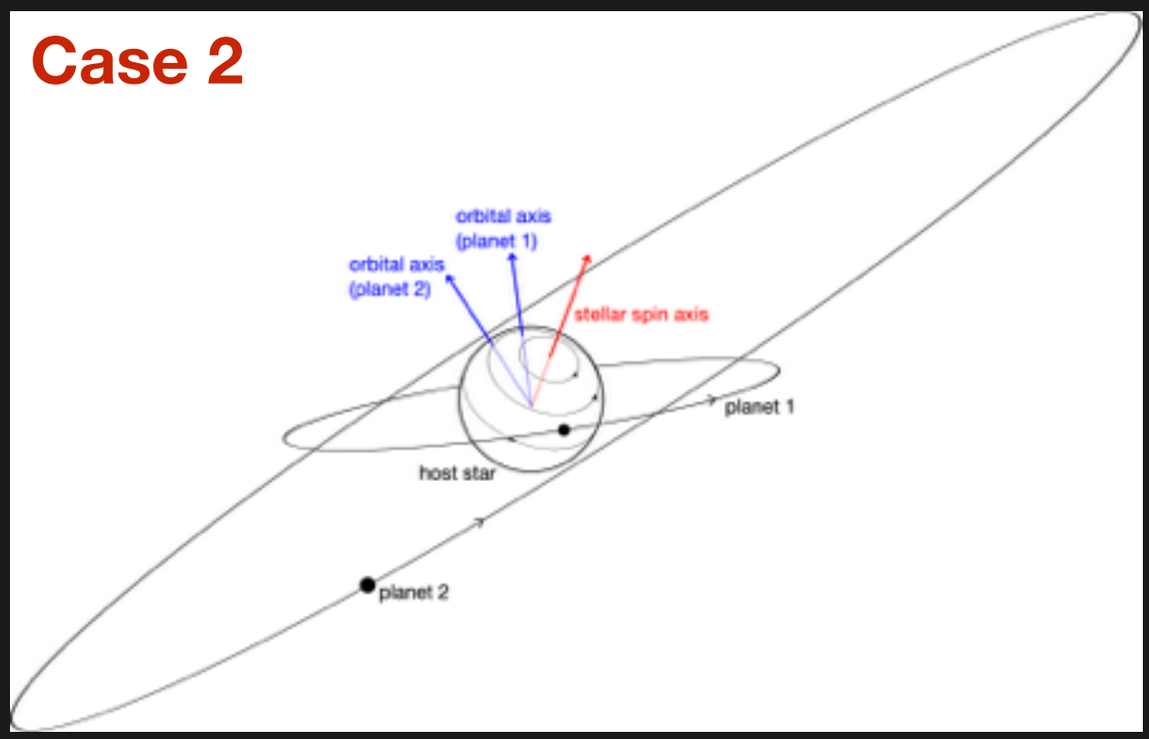
scattering between multiple planets, secular resonance, perturbation due to the stellar companion…

—> both ***spin-orbit*** and ***orbit-orbit*** misalignments are possible

Case 1



Case 2



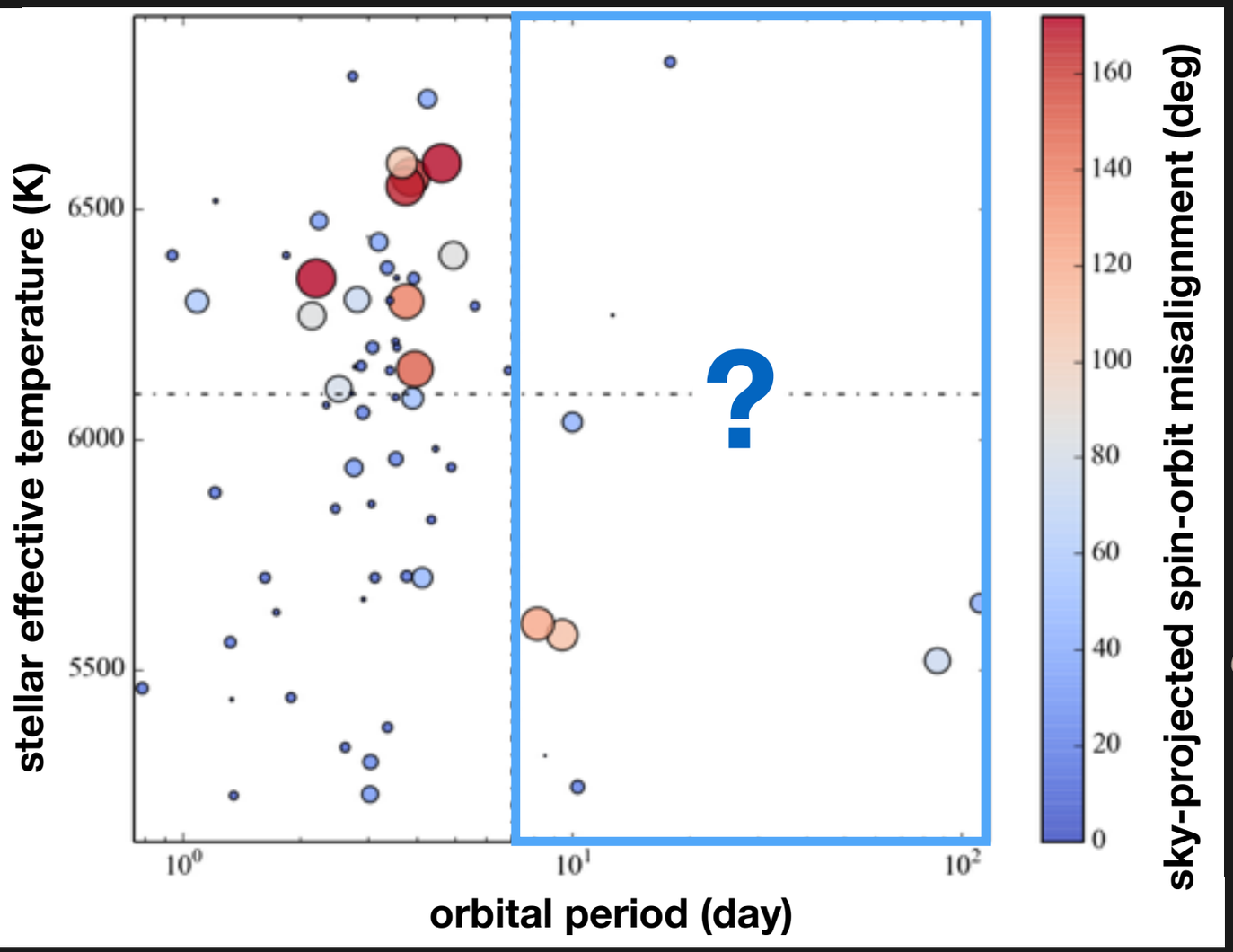
Toward a comprehensive view of planet formation and evolution

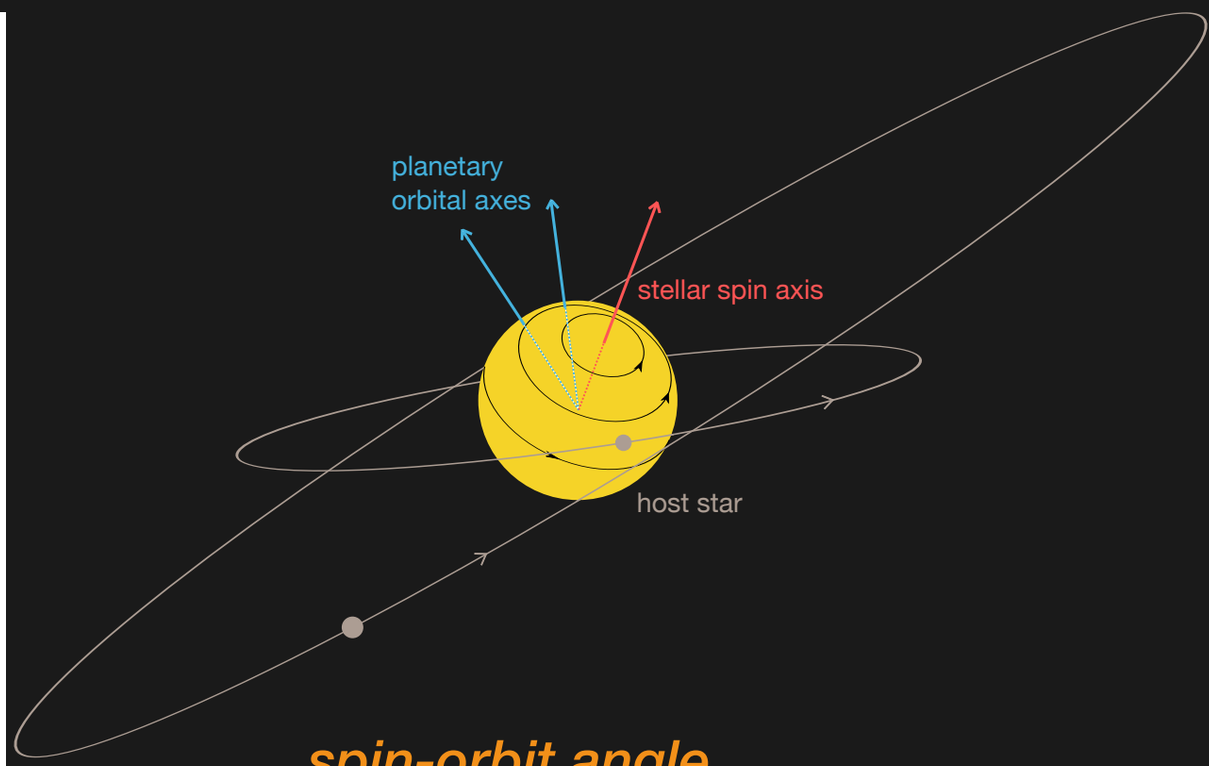
spin-orbit angles of long-period planets from various ***photometric techniques***

+

3D architecture from ***dynamical analyses*** (transit timing/duration variations)

—> dynamical history of observed systems and the role of migration





spin-orbit angle
mutual orbital inclination
orbital eccentricity
planetary mass
multiplicity…