

Stellar Obliquity Distribution of Exoplanetary Systems

Jiayin Dong^{1,2} Dan Foreman-Mackey¹

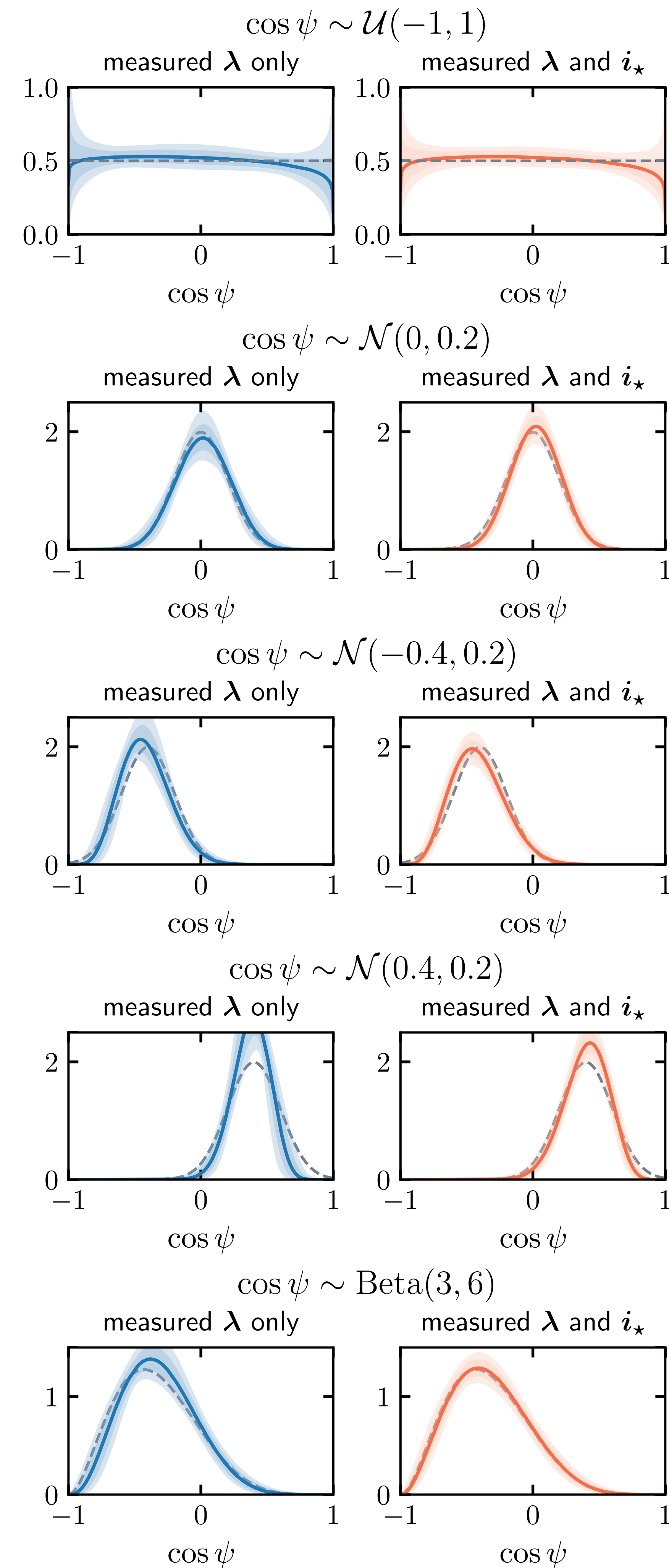
¹CCA, Flatiron Institute ²Flatiron Research Fellow

arxiv.org/abs/2305.14220

github.com/jiayindong/obliquity

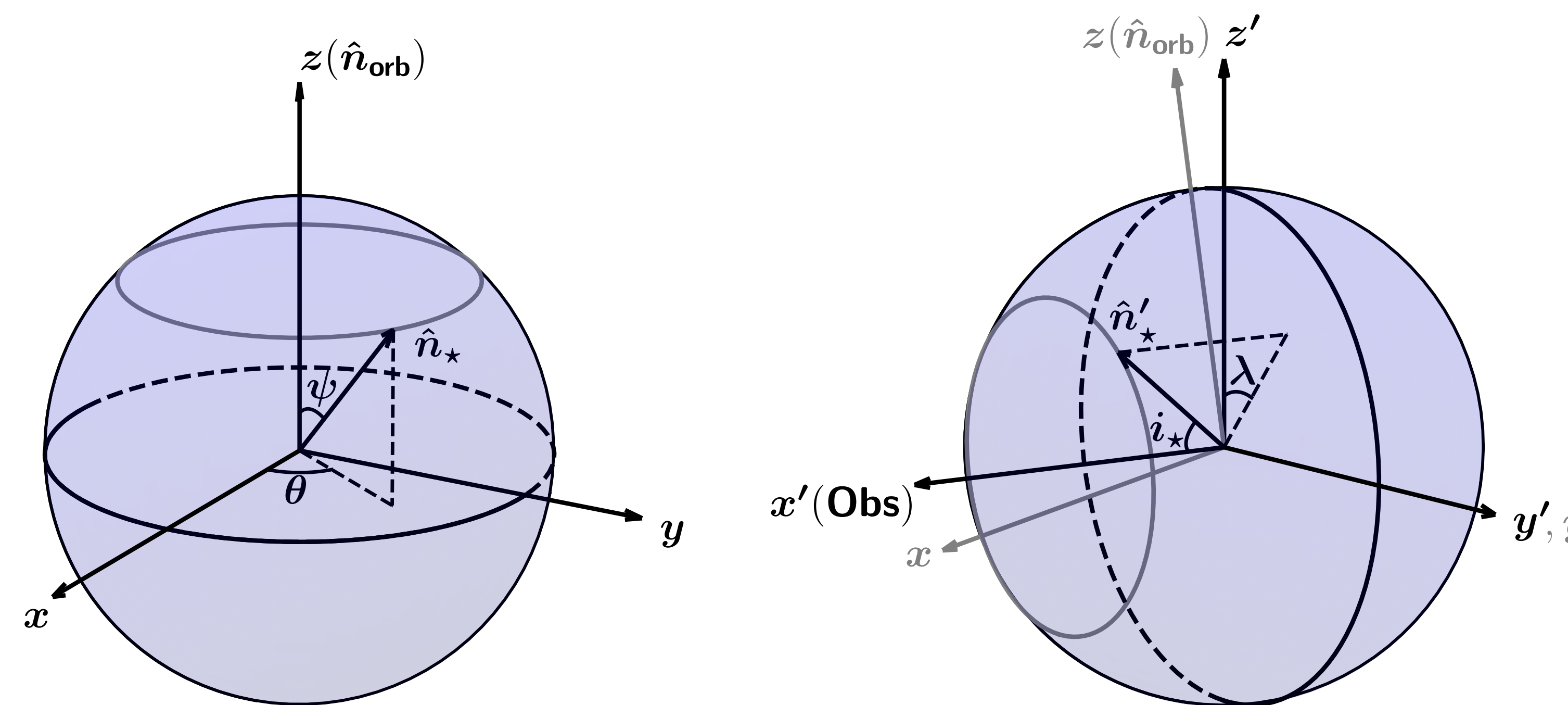
Application to Simulated Data

Stellar obliquity distribution can be inferred **purely** from sky-projected stellar obliquities.

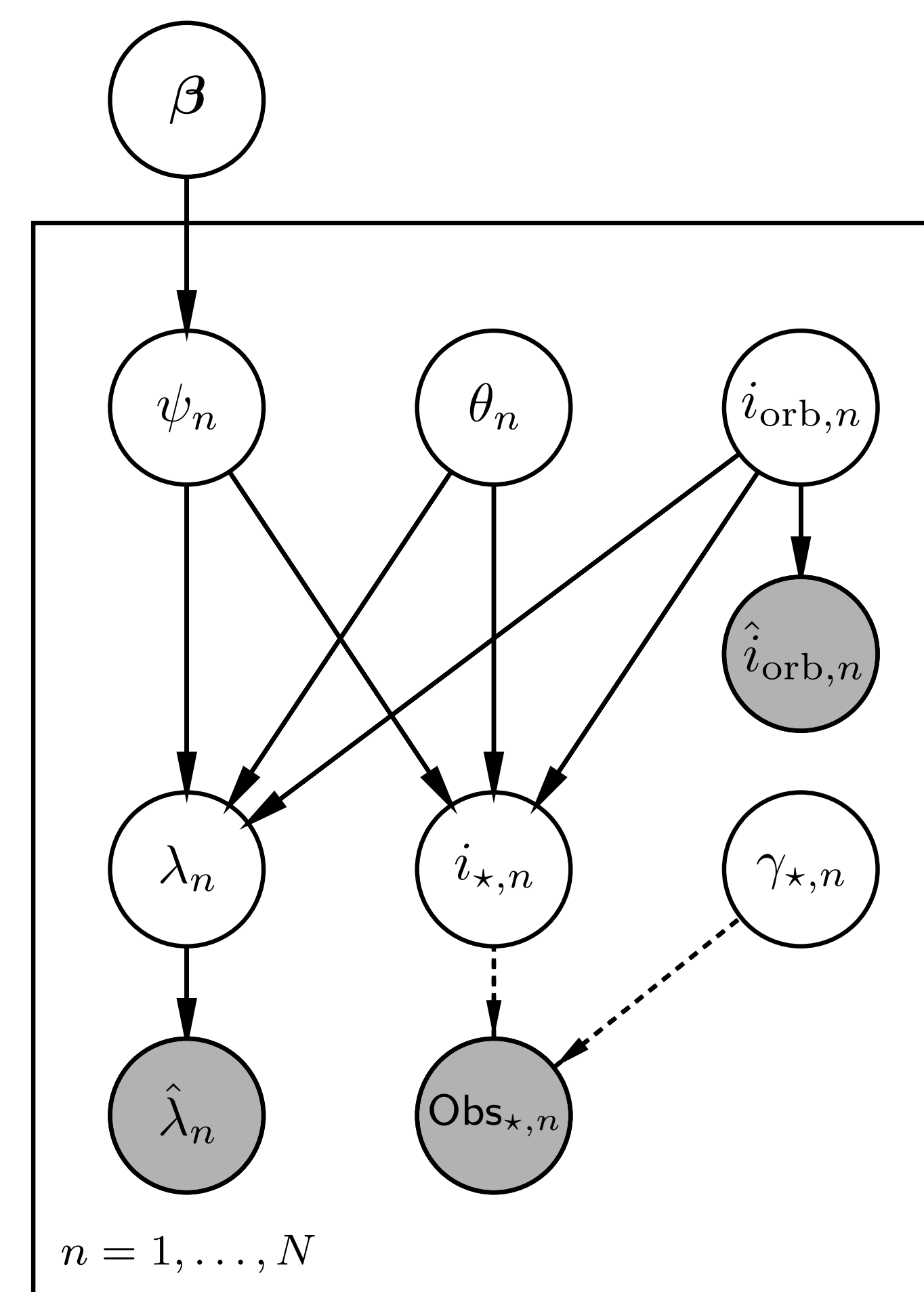


Physical Properties $\{\psi, \theta\}$

Observables $\{\lambda, i_★, i_{orb}\}$

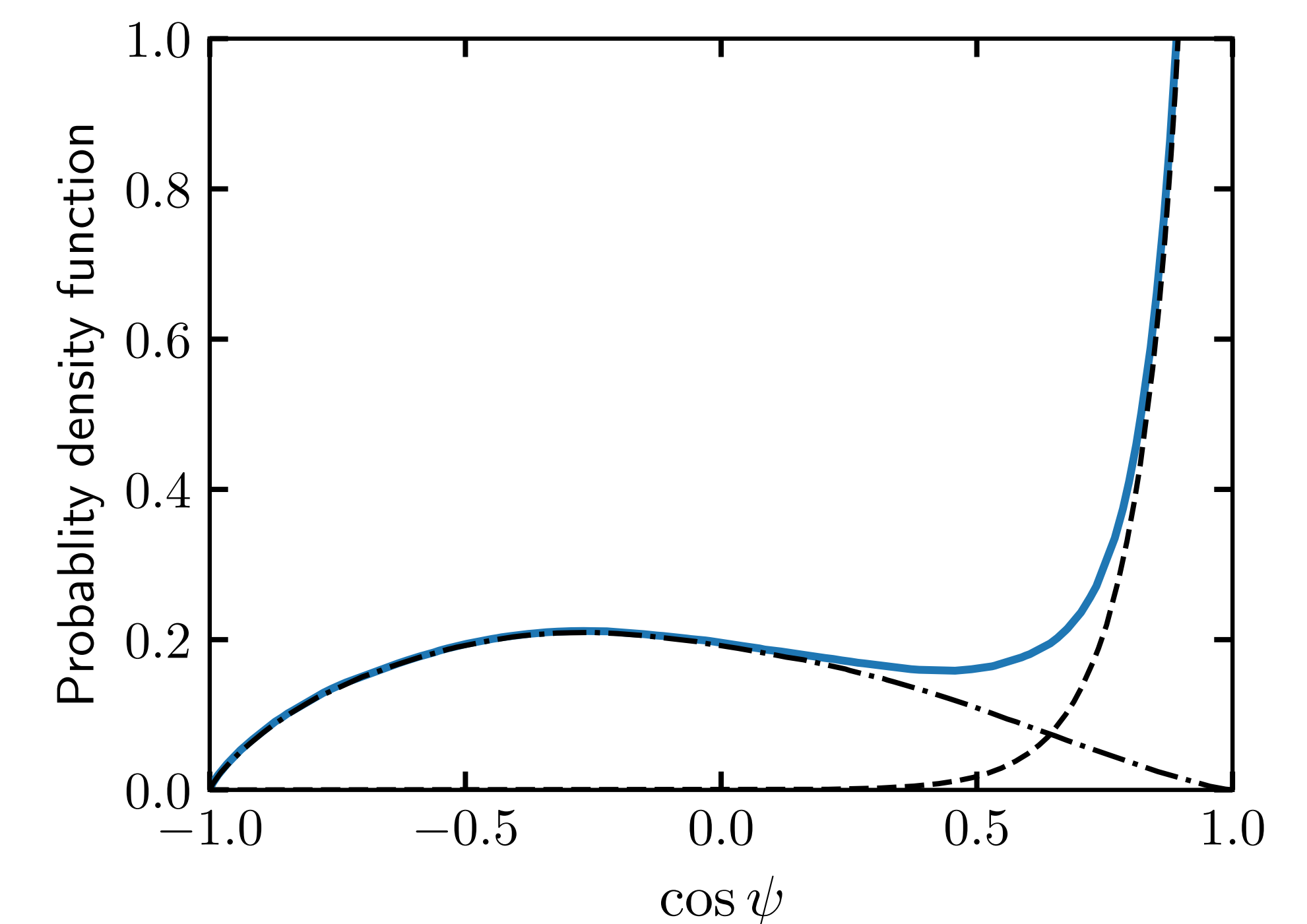


A Hierarchical Bayesian Framework for Inferring the Stellar Obliquity Distribution



Application to Observations

The majority of close-in exoplanetary planets (sample from Albrecht+22 review) are aligned. Misaligned systems follow a **nearly isotropic** distribution.



Where are the Polar Planets?

Polar planets are found in the subsample of systems with $i_★$ measurements (from Albrecht+21), but this subsample **could be biased** by the $i_★$ detection requirement. E.g., gravity darkening prefers to find polar planets.

