Ages of “Singles” vs “Multis”: Predictions for Dynamical Sculpting over Gyr in the *Kepler* Sample

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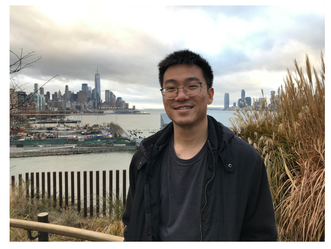
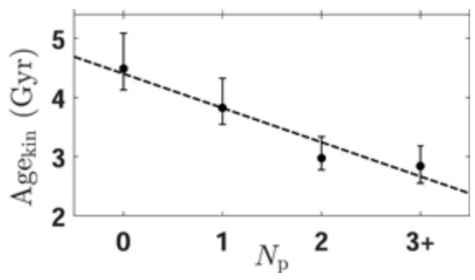
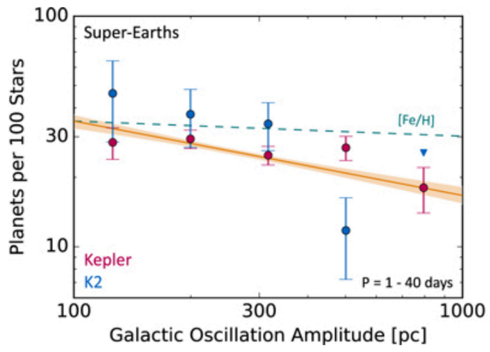


Scan for virtual poster and repo!

What are we probing?

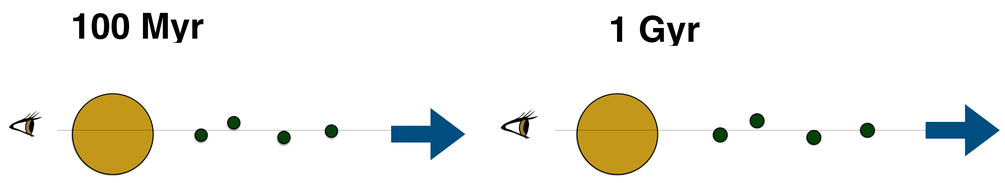


Chen+ 2021

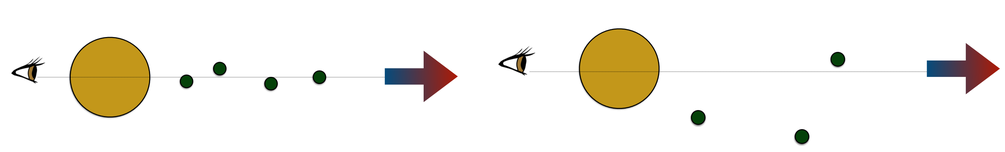


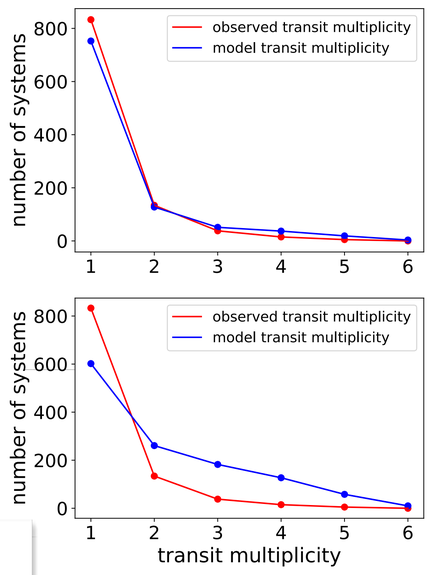
Zink+ 2023

Architecture is locked in at birth



Ongoing dynamical sculpting

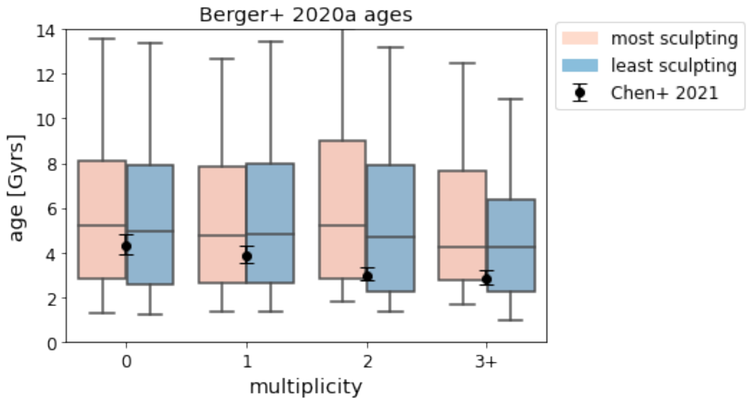




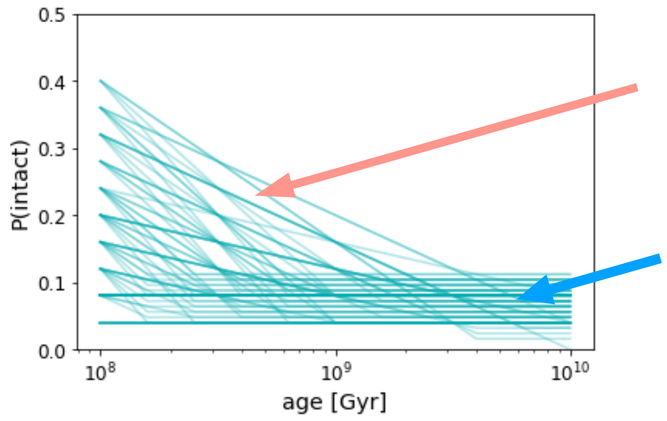
Lam & Ballard, submitted

Do planetary system multiplicities and architectures evolve on Gyr timescales? We explore the hypothesis of **dynamical sculpting**: as dynamical temperature increases, planet orbits get perturbed to higher eccentricities and inclinations, or they may experience orbit crossings that lead to ejections.

What did we find?



Lam & Ballard, submitted



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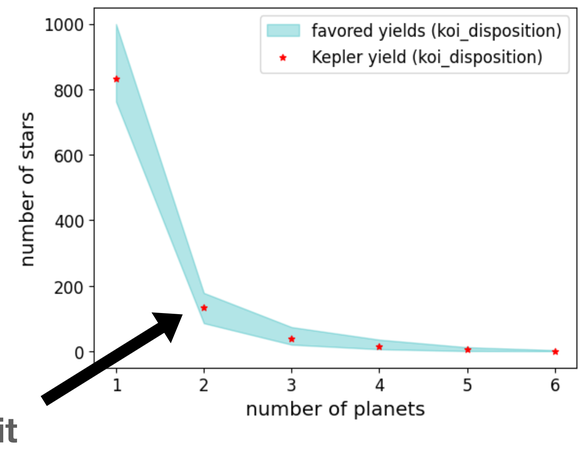
Favored: the fraction of dynamically cool (“intact”) systems changes over Gyr

Also favored: the intact fraction starts lower but doesn’t change after 100 Myr

Both models have transit multiplicity yields resembling *Kepler*’s!



Is there actually a difference in multiplicity between young and old systems? Not using the isochrone ages and their errors from the Berger+ 2020a *Gaia-Kepler* crossmatch.

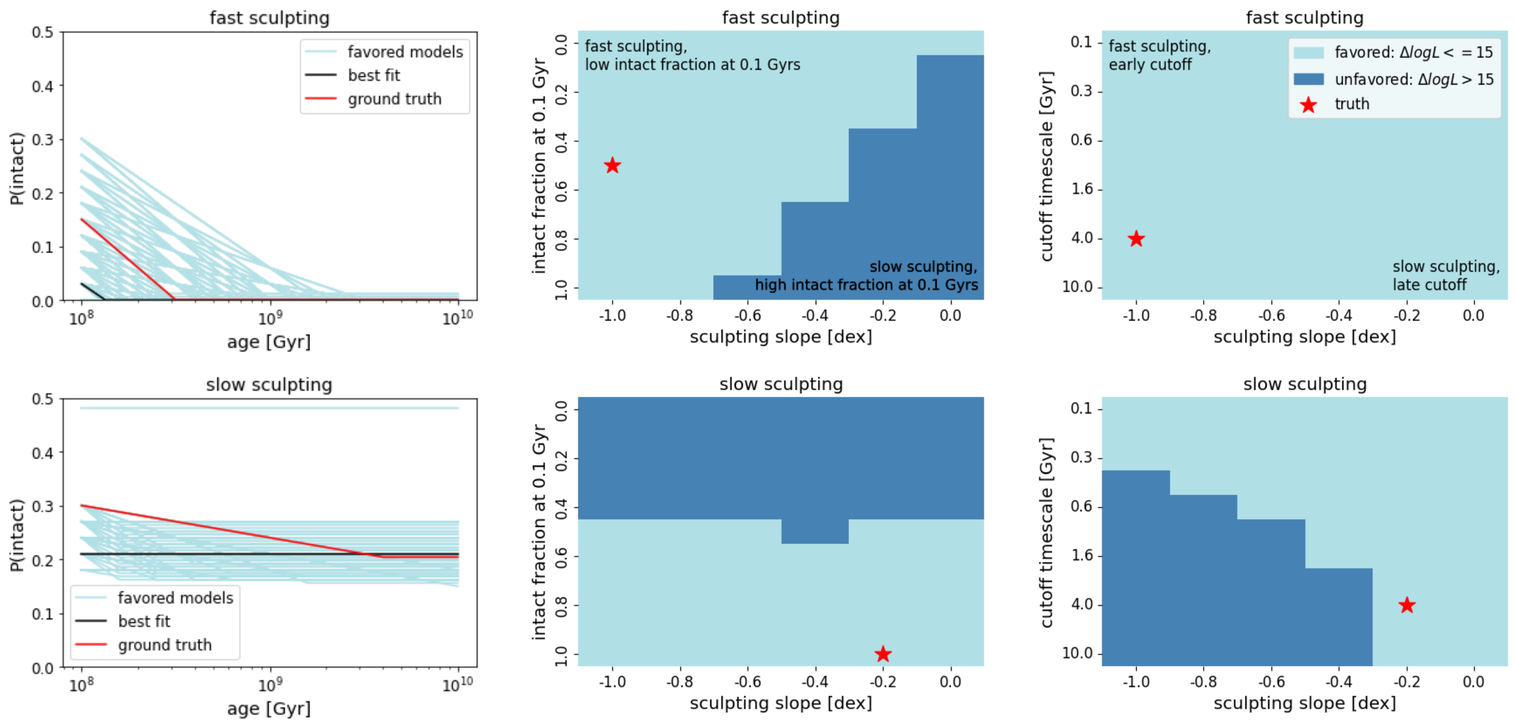
Yet, there are many different dynamical sculpting laws that match the *Kepler* transit multiplicity. Thus, transit multiplicity alone is insufficient for constraining Gyr sculpting. We may need some law that turns on later, or it may imprint through some other observables.

How did we do it?

We ran injection-recovery tests on different sculpting laws.

Depending on the ground truth, we can rule out different amounts of parameter space.

Across the board, we found that the primary driver of a model’s likelihood is the present-day intact fraction it yields.



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Acknowledgments

This material is based upon work supported in part by the National Science Foundation GRFP under Grant No. 1842473. We wish to thank Jamie Tayar, Matthias He, Jason Dittmann, Quadry Chance, Sheila Sagear, Natalia Guerrero, and especially Sarah Millholland for their helpful comments and suggestions. We acknowledge that for thousands of years the area now comprising the state of Florida has been, and continues to be, home to many Native Nations. We further recognize that the main campus of the University of Florida is located on the ancestral territory of the Potano and of the Seminole peoples. The Potano, of Timucua affiliation, lived here in the Alachua region from before European arrival until the destruction of their towns in the early 1700s. The Seminole, also known as the Alachua Seminole, established towns here shortly after but were forced from the land as a result of a series of wars with the United States known as the Seminole Wars. We, the authors, acknowledge our obligation to honor the past, present, and future Native residents and cultures of Florida.