



Quantifying the Similarity of Planetary System Architectures:

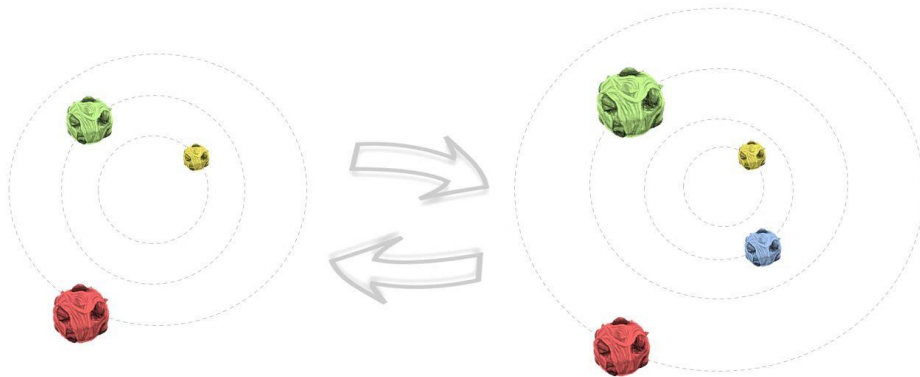
A useful tool to compare TESS planetary systems candidates

Dolev Bashi & Shay Zucker

Porter School of the Environment and Earth Sciences, Raymond and Beverly Sackler Faculty of Exact Sciences, Tel Aviv University ; e-mail: dolevbas@mail.tau.ac.il

What makes two planetary systems similar?

There is a wide diversity of exoplanetary system architectures among stars in the Galaxy, yet it is unclear what should be the preferred approach to quantify this diversity. We propose the use of a novel approach, using a weighted extension of the 'Energy Distance' (WED) metric [1], to quantify the similarity between planetary systems.



We extend the WED to define the inter-catalogue energy distance (ICED)- a distance metric between sets of multi-planetary systems. ICED offers an integrative approach that can also be useful in comparing observed catalogues with planetary population-synthesis models of planet formation and evolution.

For more information and what's the connection to PASStA,
see full paper and code by pressing these logos:

<https://github.com/dolevbas/PASStA>

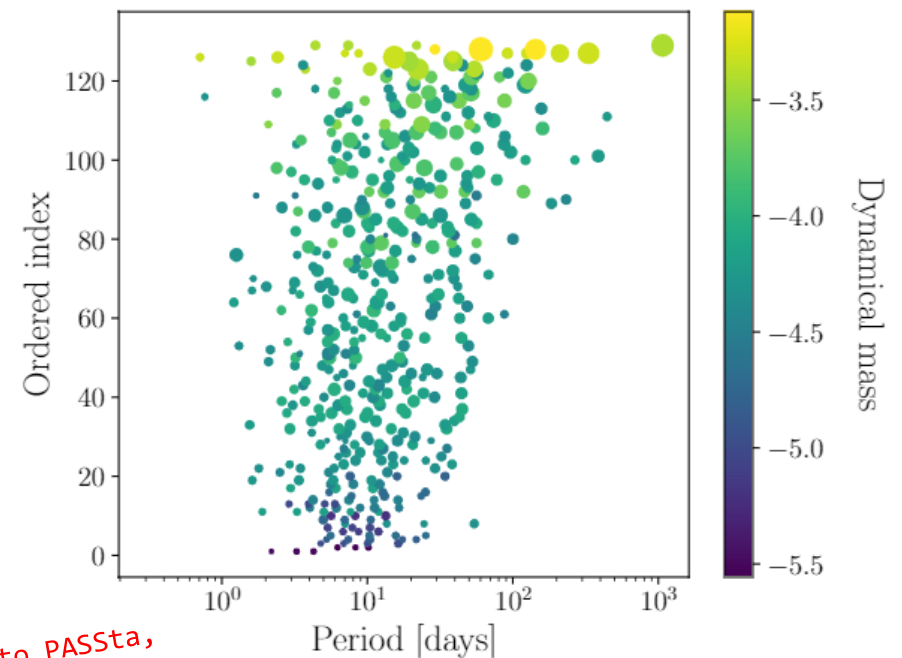
<https://www.aanda.org/component/article?access=doi&doi=10.1051/0004-6361/202140699>

Astronomy
& Astrophysics



Order in Multi-planet Systems

Based on the WED, the 'Sequencer', which is an automatic tool searching for trends in a dataset [2], identifies a progression from small and compact high-multiplicity ($N_p \geq 3$) *Kepler* systems to systems with distant giant planets.



[1] Székely, G. J. 2002, E statistics: Energy of Statistical Samples, Bowling Green State University, Department of Mathematics and Statistics Technical Report No. 03-05

[2] Baron, D., & Ménard, B 2020, arXiv 2006.13948