



EPSC Abstracts

Vol. 15, EPSC2021-811, 2021

<https://doi.org/10.5194/epsc2021-811>

Europlanet Science Congress 2021

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Six transiting planets and a chain of Laplace resonances in TOI-178

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Determining the architecture of multi-planetary systems is one of the cornerstones of understanding planet formation and evolution. Resonant systems are especially important as the fragility of their orbital configuration ensures that no significant scattering or collisional event has taken place since the earliest formation phase when the parent protoplanetary disc was still present. As unveiled by TESS, CHEOPS, ESPRESSO, NGTS and SPECULOOS, TOI-178 harbours at least six planets in the super-Earth to mini-Neptune regimes, all planets but the innermost one form a 2:4:6:9:12 chain of Laplace resonances, and the planetary densities show important variations from planet to planet. TOI-178 have hence several characteristics that were not previously observed in a single system, making it a key system for the study of processes of formation and evolution of planetary systems. We will review what we know of TOI-178, and what we expect from futur observations.