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Title: Multiple-Planet Systems: Full Architectures via TTV and TDV
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Abstract: Kepler has been a watershed for the study of multiplanet systems. It has found hundreds of systems with multiple transiting planets, allowing statistical studies into their orbital architectures and size distributions. Their dynamical interactions are sensitively probed by transit timing variations, which are detected in over 100 planets. We report a first attempt at modelling all the systems with large TTVs. It has revealed that in quite a few systems, the multiple planets we see in transit are accompanied by at least one non-transiting one, allowing a more complete picture of the architectures of these systems. Secondly, we report the constraints on additional misaligned planets through the statistics of transit duration variation (TDV) measurements. Together, TTV and TDV are crucial for understanding the full population of multiplanets, beyond the biased set that we see as multiple transiting planets.