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Abstract:
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It was once widely believed that planets formed peacefully in situ in their proto-planetary disks and subsequently remain in place. Instead, growing evidence suggests that many giant planets undergo dynamical rearrangement that results in planets migrating inward in the disk, far from their birthplaces. However, it remains debated whether this migration is caused by planet-disk interactions or by multi-body interactions, such as planet-planet scattering, the Kozai mechanism, or secular chaos. As part of our study of giant planet migration using the Kepler sample, we present the case study of KOI-1474 system, which harbors: 1) an eccentric, transiting “warm" Jupiter displaced from its birthplace, and 2) a non-transiting, long period Jupiter, whose presence is revealed via transit timing variations, transit duration variations, and ground radial-velocity follow-up. Through a combined analysis of photometry, radial-velocities, and host characterization, we place constraints on the system’s three-dimensional architecture and assess its consistency with several planetary migration scenarios.