

The capture and release of Trojan asteroids by the giant planets during the solar system history

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Trojan objects can be dynamically stable over billions of years, implying that they carry precious information about the history of the solar system. We performed numerical simulations to investigate the origin and long term evolution of Trojans of the four giant planets. The results suggest all giant planets are able to capture and retain a significant population of Trojan objects from the primordial planetesimal disk after planet migration. In general, captured Trojans yielded a wide range of eccentricities and inclinations. The bulk of captured objects decay over Gyr providing an important source of new objects on unstable orbits. Our results suggest the bulk of observed Jovian and Neptunian Trojan populations are the survivors from a larger captured population, but their high-*i* component ($>20\sim 25$ deg) remain unexplained so far.

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