

Abstract Submitted
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Effects of Galactic Tide on Trans-Neptunian Objects JINGYU

ZHANG, Agnes Scott College — Sheppard and Trujillo first predicted a planet to exist far beyond Pluto in 2014, a hypothetical planet called Planet Nine. Planet Nine can shepherd extreme trans-Neptunian objects (TNOs) into clustering orbits. Previous study indicates that TNOs with semimajor axis greater than 250 AU show clustering in orbital orientation and planes. In this project we examined the dynamical effects of galactic tidal force on the outer solar system and the hypothesis of Planet Nine. We considered the following ingredients that can affect the orbits of the TNOs — the Neptune, the gravitational potential J2 term (the inner giant planets), Planet Nine and the galactic tidal force. We used the N-body simulation method in *Mercury* package to calculate the integration and plot the four orbital elements versus time. The result shows us that both galactic tidal force and the Planet Nine can lead to clustering on orbital orientation, though with different properties. Different behaviors of clustering due to galactic tidal force and Planet Nine can help the scientists constrain the properties of Planet Nine. For studying the outer solar system and exoplanets, it is imperative to understand the dynamic property of Planet Nine and the effect of galactic tidal force.

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