

# Dynamics of the Trans-Neptunian Triple (47171) 1999 TC<sub>36</sub>

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Plutino (47171) 1999 TC<sub>36</sub> is the only known Trans-Neptunian Object (TNO) that is a hierarchical triple, as opposed to more planet-like multiple-moon systems of Pluto and Haumea. As described by Benecchi et al. (2010), the tight inner equal-sized binary (with diameters of 250-300 km) with a 1.9 day orbital period is orbited by a third component about 140 km in diameter on a 50-day orbit with an eccentricity of 0.3. It is possible, but still unconfirmed, that the inner binary is doubly-synchronous, and the densities of the three component are only about 500 kg/m<sup>3</sup>. Apart from the question of formation, the most interesting feature of the system is that eccentricity of the inner binary is about 0.1, despite the expected tidal circularization timescale being on the order of 10<sup>8</sup> years. I will present analysis of the triple's orbital evolution over the age of the Solar System, and discuss the implication for its formation. Our preliminary work indicates that, unlike an oblate planet with a close satellite, a pair of tidally evolved triaxial bodies have a much less stable secular orbital behavior. Not only does the triaxiality slow down apsidal precession, but the precession rates are also sensitive to librational behavior of each component (Borderies and Yoder 1990). Forced librations depend on the eccentricity (Wisdom et al. 1984), which opens a possibility of a feedback loop between librations and secular resonances with the outer component. At the workshop, I will present numerical simulations of the dynamics of the system for a range of possible shapes and tidal parameters of the components.