

CONSTRAINTS ON THE SCATTERED DISK POPULATION FROM BINARY COLD CLASSICAL KBOS . Malena Rice¹, Gregory Laughlin¹. ¹Department of Astronomy, Yale University, 52 Hillhouse Ave., New Haven, CT 06511.

Introduction: The substantial population of binaries in the cold classical Kuiper belt has strong implications for the formation mechanisms and multiplicity of the outer solar system small body populations. The New Horizons extended mission recently conducted a flyby of the cold classical binary Kuiper belt object (KBO) 2014 MU69, returning images of unprecedented resolution for a small body beyond Pluto’s orbit and revealing that MU69 has an unexpected flattened shape.

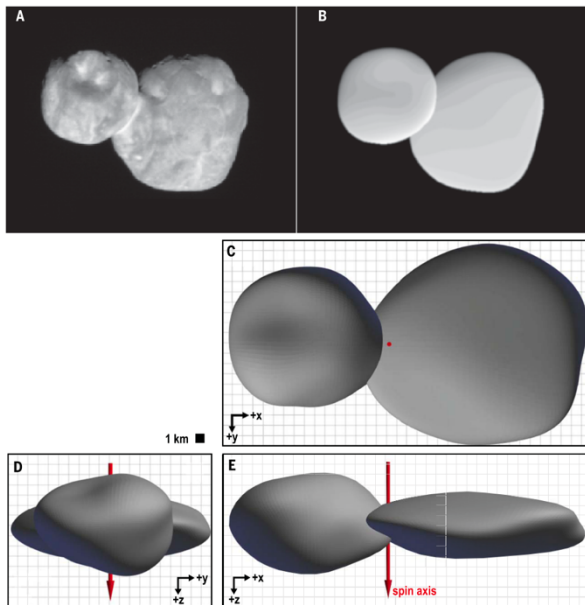


Figure 1. (A) Image of MU69 from the New Horizons extended mission. (B) Best-fitting shape model with the same viewing orientation as (A). (C-D) Orthogonal viewing angles of (B) to display the full 3D shape model [1].

Results: We explore how the collisional history of MU69 with the scattered disk population can be used to account for the object’s unusual shape. Furthermore, we discuss implications of this analysis for the number density and size distribution of the scattered disk population, as well as subsequent consequences for current solar system formation theories. We close with a discussion of how repeated high-precision occultation measurements can be used to obtain accurate 3D shapes for KBOs, permitting tests of our models in the absence of direct imaging from

spacecraft.

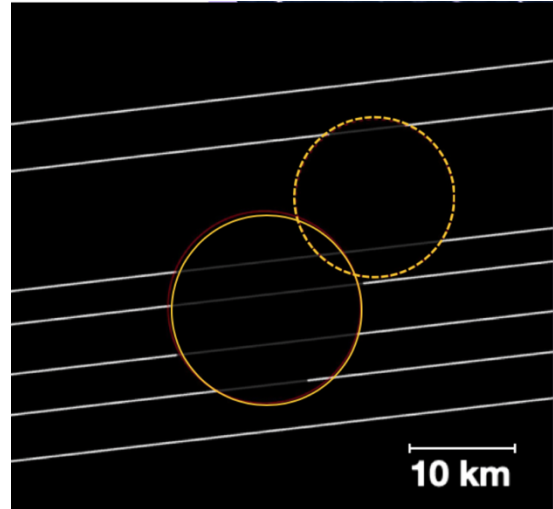


Figure 2. Occultation chords measured across MU69 prior to the New Horizons flyby. Five chords run across the solid body of MU69, providing an excellent estimate of the object’s 2D shape [2].

Conclusions: We report implications of the binary asteroid population in the cold classical Kuiper belt for the scattered disk population, with a focus on MU69 as one of the best-studied sample objects. We discuss how occultation measurements can be used to test our models and to characterize the binary KBO population in greater detail.

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References: [1] Stern, S.A., Weaver, H.A., Spencer, J.R. et al. (2019). *Science* **364**, 649. [2] Adapted from NASA/ JHU-APL / SwRI / Alex Parker