Physical Characterization of NEA 2012 TC4



William H. Ryan & Eileen V. Ryan (New Mexico Tech/MRO)

PDC 2017



2012 TC4

October 2017 Apparition

- Nominal close approach of 0.15 LD (0.03-0.7 LD)
- Visual magnitude V~15
- JPL Sentry VI/ESA Risk List
- Extensive observing campaign

October 2012 Discovery Apparition

- Passed within 0.25 LD of Earth
- V~15
- Observed as part of Magdalena Ridge Observatory NEO Target of Opportunity program – objective was to identify spin rate



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2012 TC4 Rotational Period

Large amplitude (~0.9 mag) 12.2 minute period composite lightcurves generated by multiple observers

=> **Highly elongated** (a/b>2.3) object of non-negligible strength



Warner, B.D. (2013). *Minor Planet Bul.* 40, 71-80.

Polishook, D. (2013). Minor Planet Bul. 40, 42-43.

Odden, C.E., Verhaegh, J.C., McCullough, D.G., and Briggs, J.W. (2013). *Minor Planet Bul.* **40**, 176-177.

Carbognani, A. (2014). Minor Planet Bul. 41, 4-8.



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Photometric Calibrations (Landolt-based)

- V-R= $0.41\pm0.02 \Rightarrow Q,X,V-ish$?? (Dandy et al. 2003)
- Phase Curve derived from mean magnitudes on two nights



	G	Slope 25-30° (mag/deg)
С	0.09	0.031
S	0.23	0.027
E,V	0.4	0.024

Harris, 1989







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Summary

- MPC: $H \sim 26.7 \implies D \sim 10-30 \text{ m} (albedo \sim 0.05-0.3)$
- This Work: $H \sim 27.0 \pm 0.4$ Albedo $\sim 0.35 \pm 0.1 => D \sim 7-13$ meters

2012 TD4 is a highly elongated $(a/b>2) \sim 10$ meter diameter, possibly basaltic, object of non-negligible strength.

• Oct 2017: Examine lightcurve for any changes in the rotation state of the elongated object due to the close approach in 2012.





Small asteroids still require our <u>attention</u>!



Carancas, Peru (2007) ~3 m impactor (Tancredi et al., ACM 2008)



