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Physical Characterization of NEA 2012 TC4

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ABSTRACT

The ten-meter class near-Earth asteroid 2012 TC4 will make a close approach to within 0.04 lunar distances of Earth on October 12, 2017. The nature of its orbit has made it an attractive Earth-impacting asteroid surrogate for an exercise testing the capabilities of the scientific and emergency response communities. For this reason, it is anticipated that considerable resources will be utilized to take advantage of the 2017 flyby to study this object in addition to the normal scientific interest. However, some physical characterization data has already been acquired during its discovery apparition in October 2012.

Broadband photometry was obtained for 2012 TC4 on 10 and 11 October 2012 using the Magdalena Ridge Observatory (MRO) 2.4-meter telescope. A periodicity of ~12.2 minutes was immediately evident in the time-series data, which was in agreement with the reported values of Polishook (2013), Odden et al. (2012), Warner (2013), and Carbognani (2014). However, the MRO data also clearly display a second period present in the lightcurve, indicating that the asteroid is in a state of

non-principle axis rotation. These data were acquired *before* closest approach in 2012 where the asteroid came within 0.25 lunar distances of Earth. Therefore, comparison of these results with the periodicities that will be observed during the 2017 apparition will be indicative of the effects of Earth's gravity since the 2012 flyby. Here, we present the details of the tumbling nature of this fast-spinning object as well as other physical characterization information (including size and taxonomic constraints) derived from multi-color photometry that may influence approaches to hazard mitigation studies. Plans for more detailed observations during the 2017 close approach will also be presented.

References:

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

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

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

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