

Tracking the Polyrhythm: Broadband Photometry and Lightcurve of the Binary Potentially Hazardous Asteroid (285263) 1998 QE2

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On August 19, 1998, LINEAR at Lincoln Laboratory ETS in New Mexico made the discovery of near-Earth asteroid (285263) 1998 QE2 using their 1.0-m f/2.15 reflector telescope and charge-coupled device, or CCD (MPEC 1998-Q19). The asteroid made its closest approach of the 21st century on May 31, 2013 at a distance of 0.039 AU, and was identified by the Minor Planet Center as being a Potentially Hazardous Asteroid. We observed asteroid 1998 QE2 from Table Mountain Observatory in Wrightwood, CA and obtained broadband photometric data, presented here, over a total of four nights from July 16-19, 2013. Our observations were made with a 0.6-m f/16 Cassegrain telescope and CCD. Long-slit CCD spectrograms of near-Earth asteroid 1998 QE2 were obtained by Hicks et al. using the Palomar 5-m Hale Telescope and the observatory's dual-channel spectrometer on June 05, 2013. The spectral results from this night were summarized in an Astronomer's Telegram (ATel #5132) along with various other targets from June 05, 2013. Both spectrographic and photometric data reductions fall in accordance with the prediction that 1998 QE2 is a Ch type asteroid (Bus taxonomy). Asteroid 1998 QE2 was a radar target observed at Goldstone throughout June 2013, and the asteroid was determined to have a moon from those observations. This paper strives to correlate our photometric lightcurve of asteroid 1998 QE2 with the known presence of the secondary body in its binary system. We determined the synodic period of 1998 QE2 to have a duration of 5.39 ± 0.02 hr using Fourier analysis methods. Our $R(1,1,\square)$ magnitude data for asteroid 1998 QE2 clearly follows the trend of its solar phase curve, and shows that the lightcurve amplitude increased as the solar phase angle increased. If time permits, I will discuss other various objects which were observed in our near-Earth asteroid photometry research at Table Mountain Observatory throughout summer 2013, while comparing and contrasting their photometric lightcurves with that of 1998 QE2, and discussing the possibilities that they may or may not have secondary companions as well.