

The orbit of binary main-belt comet 288P

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Abstract

We report on new Hubble Space Telescope observations of binary main-belt comet 288P (300163) [1, 2, 3, 4, 5] obtained between 2018 November and 2019 May. We measure the component separations and brightness using PSF fitting. Subsequently we combine the new data with previously obtained similar Hubble data (obtained in 2011 and 2016-18, Fig. 1) to model the binary orbit and its evolution with time. We discuss the implication of our findings for the nature of the activity during perihelion. The 288P system is unique among the known binary asteroids for its combination of a large semi-major axis ($\sim 100 \times$ the radius of one of the components), near-equal component size, and sublimation-driven, comet-like activity [6].

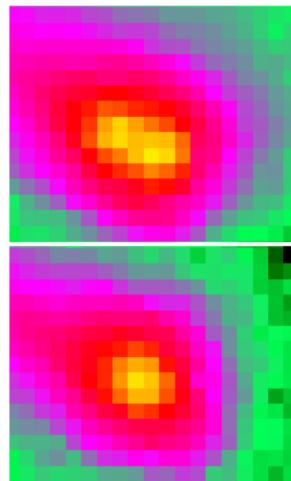


Figure 1: The 288P system on 2016 September 29 and November 13. The appearance changes from 2 clearly separated objects to apparently one. We observed similar changes of component separation multiple times, and conclude that both components represent a gravitationally bound system [6].

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References

- [1] Hsieh, H. H. et al. (2012): Discovery of Main-belt Comet P/2006 VW₁₃₉ by Pan-STARRS1, *ApJL* 748, L15.
- [2] Licandro, J. et al. (2012): Exploring the nature of new main-belt comets with the 10.4 m GTC telescope: (300163) 2006 VW139, *A&A* 550, A17.
- [3] Novaković, B. et al. (2012): P/2006 VW₁₃₉: a main-belt comet born in an asteroid collision?, *MNRAS* 424, 1432-1441.
- [4] Agarwal, J. et al. (2016): Hubble and Keck Telescope Observations of Active Asteroid 288P/300163 (2006 VW139), *AJ* 151, 12.
- [5] Hsieh, H. H. et al. (2018): The 2016 Reactivations of the Main-belt Comets 238P/Read and 288P/(300163) 2006 VW₁₃₉, *AJ* 156, 223.
- [6] Agarwal, J. et al. (2017): A binary main-belt comet, *Nature*, 549, 357-359.