Size and albedo of Kuiper belt object 55636

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Due to the small sizes and great distances of Kuiper belt objects (KBOs), it is difficult to determine their diameters. We report observations of a multi-chord KBO stellar occultation, which occurred on 2009 October 9 (UT; Elliot, J. L., et al. 2010, Nature, 465, 897). We set up such a network of 21 telescopes at 18 stations, spanning a distance of 5920 km and straddling the predicted shadow path for the 2009 October 9 stellar occultation by the KBO 55636. Of these stations, seven could not observe due to weather, nine reported non-detections, and two observed an occultation, both in Hawai'i: the 2.0-m Faulkes North telescope at Haleakala and a 0.36-m portable telescope at the Visitor Information Station at the Onizuka Center for International Astronomy on Mauna Kea (located at the Mauna Kea Mid Level). We find that the KBO 55636 (2002 TX300), which is a member of the water-ice rich Haumea KBO collisional family (Brown, M. E., et al., Nature, 446, 294), has a mean radius of 143 ± 5 km (assuming a circular solution). Allowing for possible elliptical shapes we find a geometric albedo of 0.88, +0.15/-0.06 in the V photometric band, which firmly establishes that 55636 is smaller than previously thought and like its parent body, Haumea, is among the most highly reflective objects in the Solar System. Dynamical calculations by two groups indicate that the collision that created 55636 occurred at least 1 Gyr ago (Ragozzine, D., & Brown, M. E. 2007, AJ, 134, 2160; Schlichting, H. E., & Sari, R. 2009, ApJ, 700, 1242), which implies either that 55636 has an active resurfacing mechanism, or that fresh water ice in the outer solar system can persist for Gyr timescales. This work was supported, in part by NASA Grants NNX10AB27G (to MIT) and NNX08AO50G (to Williams College).