The Hunt for the Shadow of an Asteroid: Observation of 479 Caprera's Occultation of HIP33753

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Asteroids are generally distant and faint, making exact estimation of their shape and size by direct observation difficult. One way of measuring them indirectly is to time the asteroid as it passes in front of a star, called an asteroid occultation. This project aims to learn more about the asteroid 479 Caprera by observing its occultation of the star HIP33753. The telescope, camera, and other equipment were set up and calibrated at a preselected location before the event. This location was inside a 40 miles wide valley where the probability of seeing the occultation was the highest. With a long exposure time of the CCD-camera (60s) without telescope tracking, star trails were created. Breaks in these indicates possible occultation events. Since it is likely that no occultation was seen, the observation instead revealed where the asteroid was not. This information combined with data from other observations of the same event was used to construct a two-dimensional map of the asteroid. The majority of those who observed the occultation reported a step-by-step brightness change of the star. It is probable that the observation was conducted outside the shadow of the asteroid because of the uncertainties in the asteroid’s positional data. Analysis of the constructed map revealed an elliptical shape with a major axis of 75.1 km and a minor axis of 68.9 km. The stepwise occultation may indicate that the star HIP33753 is a close double-star. By observing more occultations by Caprera, a complete three-dimensional model can be created.

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