

# New Detections of Binary Asteroids with Stellar Occultation (GaiaMoons)

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Binary and multiple systems are a common outcome of small-body evolution in the Solar System. A fraction of small binaries among near-Earth asteroids (NEAs), small diameter ( $D < 10$  km) and Main-Belt asteroids (MBAs) was estimated at 15% [1][2]. They represent a key population for understanding the formation and evolution of small bodies in the Solar System [3]. Nowadays, despite significant progress, the study of binary asteroids remains affected by strong observational biases and intrinsic limitations: Radar observations only target a few nearby near-Earth asteroids, adaptive optics are restricted to the largest and closest systems, and lightcurve inversion works best for tightly bound binaries with favorable viewing angles. In this context, GaiaMoons is a project that aims to identify binary candidates using Gaia astrometric data and validating asteroid companions through stellar occultation observations for a sample of 361 objects [4]. Stellar occultation is a ground-based method that yields highly precise astrometric positions (to *mas* levels) at the epoch of the event and allows the determination of key physical parameters of the system such as size (*km* level), shape, orientation, and relative component geometry [5][6]. Between October 2023 and January 2026 where a total of 165 stellar occultations observations have been performed for 101 different objects with the help of the amateur community in France and abroad. Out of 165 observations, 76 led at least to one positive observation. Among them, 33 with at least 2 positives for 24 objects that have undergone unprecedented occultation observation campaigns. For the vast majority of these objects, unique physical and astrometric constraints, as they had never been observed through stellar occultations before [7]. Among them, 2000  $SW_{155}$  in particular, has been observed in August 2025 and presents strong binary features (Fig. 1). This talk will focus on the main results of these campaigns and their implication in the small binaries population sample thanks to Pro/Am collaborations.

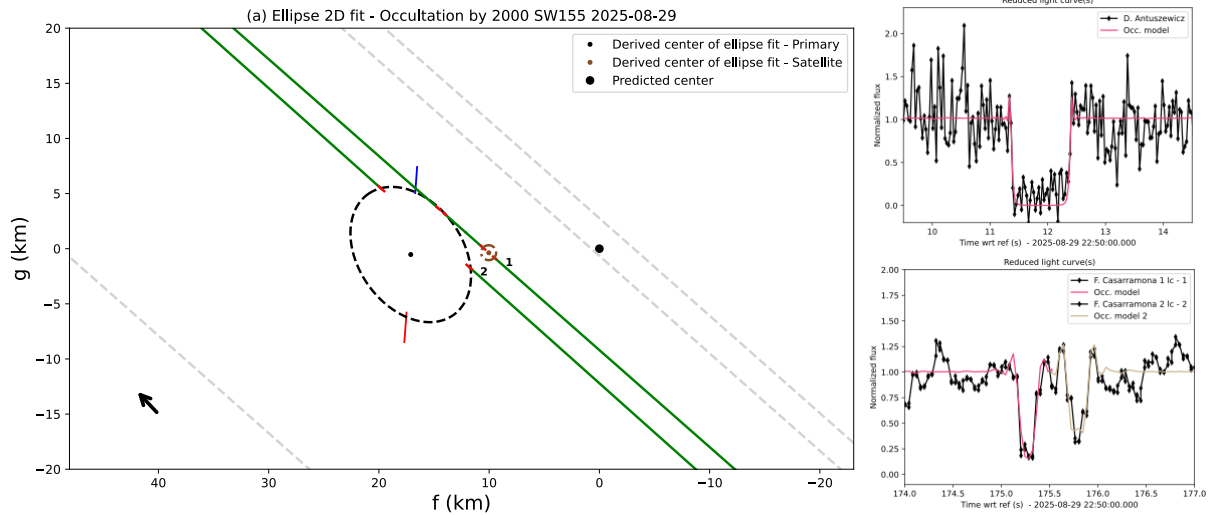


Figure 1: (Left) Sky plane projections (Right) Positive lightcurves and models for (36882) 2000 SW<sub>155</sub> stellar occultation event of August 28, 2025.

## References

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