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Pro/Am Collaborative Observation of Ganymede Stellar Occultation on 2025/10/14

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Among the most fascinating objects in our solar system, **Ganymede** stands out as the largest moon of **Jupiter** and one of its four **Galilean satellites**, discovered by Galileo Galilei in 1610. Its colossal size, even surpassing that of the planet Mercury, makes it a prime target for scientific exploration in the JUICE ESA mission. However, its close proximity to Jupiter presents a unique challenge : the influence of the planet complicate efforts to determine Ganymede's precise position in space. To overcome this hurdle, we choosed to observe Ganymede using the stellar occultation technique. Stellar occultations occur when a solar system object passes in front of a star, briefly blocking its light, creating a shadow detectable by the observer. As the object moves, the shadow also moves along way, creating an occultation path on the surface of the Earth. The analysis of the light curve emitted by the star using aperture photometry allows the determination of key physical parameters of the object - such as size, shape, orientation, and relative component geometry **[1,2]** - with kilometric accuracy **[3]**. On October 14, 2025, Jupiter's largest natural satellite occulted a 6-magnitude star all over Europe. This occultation has been observed by 52 observers, with 36 positives chords Europe (Figure 1). Amateur and professional astronomers gathered to provide unique insight in Ganymede astrometry. An overview of this campaign will be presented. A focus will be made on the analysis of the results with the implications for the future flyby of JUICE over Ganymede in 2029.

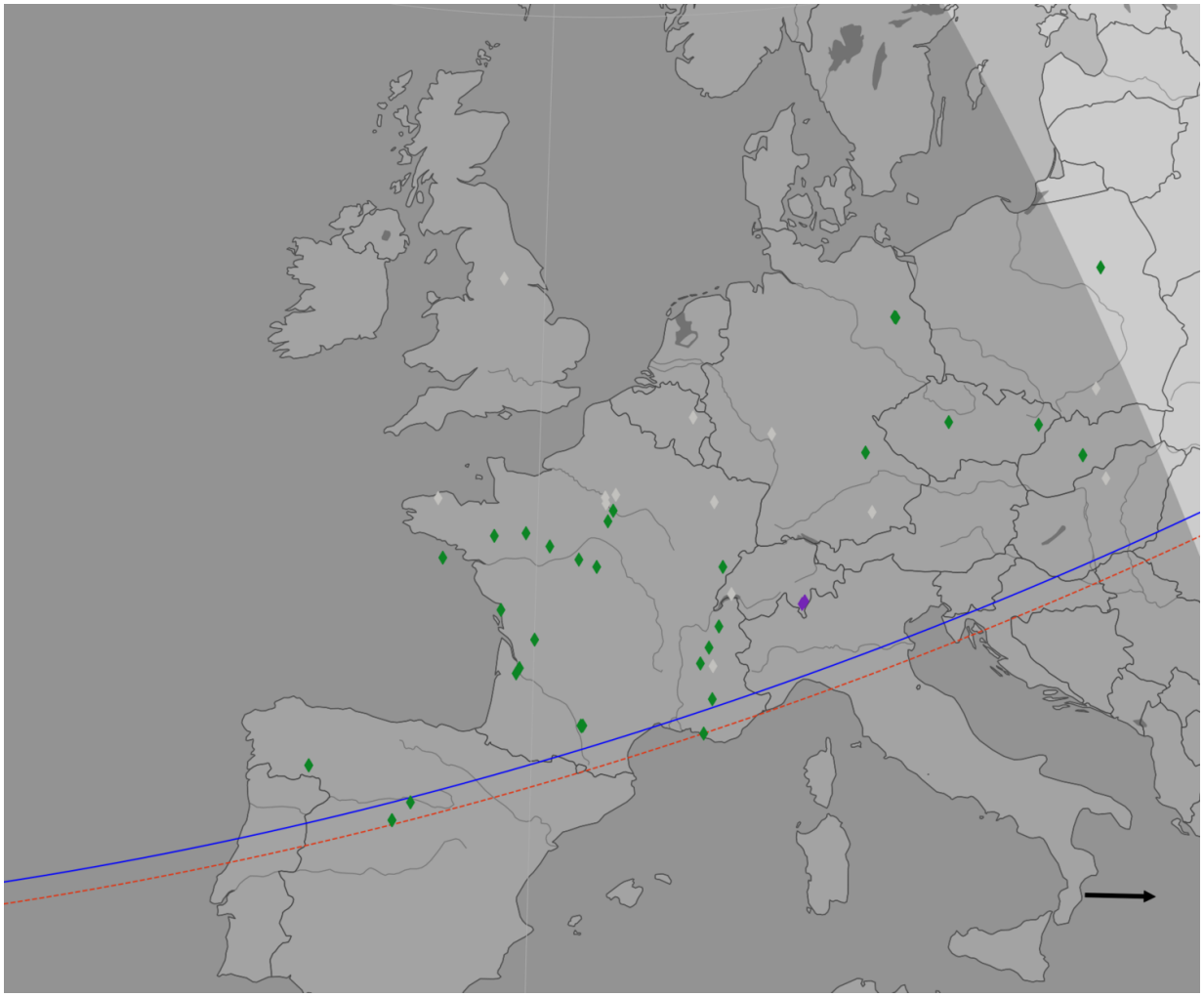

Figure 1: Post occultation map of the stellar occultation by Ganymede on October 14, 2025. The observing stations are displayed with the following colour code: Green - Positive, White - Overcast, Purple - Technical issues. The black arrow shows the direction of motion of the shadow. The dark grey region corresponds to astronomical night, while the light grey region corresponds to astronomical twilight.

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