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Strategies for Rapid Implementation of Interstellar Missions: Precursors and Beyond (4)

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FEASIBILITY ASSESSMENT OF DECELERATION TECHNOLOGIES FOR INTERSTELLAR PROBES

Abstract

Sending a probe to another star will likely be a costly endeavour, which needs to be justified by a return of investment such as scientific value. The ability to decelerate at the target system is important, as it would significantly enhance the scientific return of such a mission, as the probe would be able to collect data for a longer duration. To date, a number of concepts have been proposed for decelerating an interstellar probe. However, a systematic comparison of the different approaches along with their feasibility seems to be missing. This paper compares and assesses the feasibility of deceleration concepts, which are based on momentum exchange with the interstellar medium, the stellar wind or radiation. The comparison is based on factors such as technology readiness level, mass-specific deceleration force, and qualitative (dis-)advantages. Based on this analysis, the most feasible near-term approach is identified together with a roadmap for its development.