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

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COMPREHENSIVE CASE STUDY OF AN INTERSTELLAR TRAVEL TO BARNARD'S STAR VIA ELECTRIC ION PROPULSION EMPLOYING SEMI-RELATIVISTIC FLIGHT PARAMETER

Abstract

'Atteindre les étoiles' or Reaching Stars has always intrigued mankind for meliorism. While the farthest location that we have been able to reach is the Moon, going to a nearby planet such as Mars with a manned mission still seems to be at least a decade away bounded by the current technology. Additionally, there is no impending advancement of technologies for deep space missions with unmanned probes compared to Voyager missions. Even reaching Heliopause will take a multitude of decades to pass with the present technology. As the dream of stars compels many scientists to find ways for interstellar missions, it may only be propelled with propulsion techniques that may allow traveling with semi-relativistic accelerations. This paper discusses the possibility of an interstellar mission to Barnard's Star. Barnard's star is the sixth closest star system to our Solar system, potentially harboring two planets in orbit. The detection of the exoplanet, which seems to be classified as Super-Earth is exciting as it indicates a possibility of life on one of the exoplanet systems. This paper will present a case study analysis of interstellar travel to the star system, evaluating different modes of propulsion and plotting the distance, time and specific impulse for the Electric Ion Propulsion system which promises to reach in a reasonable amount of time. The challenges of such a mission will be presented in detail and the effects of relativistic speeds is considered along with the effect corresponding to mass expansion and time dilation. Each result will be plotted and compared for this mission along with its implications.Thus while this paper presents the space dynamics of an interstellar travel it also delves into the study of Propulsion system that a spacecraft may use to reach that destination.