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CASE STUDY OF AN INTERSTELLAR MISSION TO LUHMAN 16: UNMANNED INTERSTELLAR  
PROBE POWERED BY GAS CORE NUCLEAR REACTORS

**Abstract**

‘Le Reve d’Etoiles’ or the Dream of Stars has been a common dynamo for mankind since the dawn of the civilization. Ever since his first gaze above, he has felt the compulsion to reach out there. However, this has remained a dream rather than a reality due to the limitations in current space technology. When it comes to manned missions, 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 half a decade away with the present technology. In addition, transportation of unmanned probes for deep space missions has also not really advanced too much as compared to the technologies of the Voyager missions’ era. Current technology allows for decades to pass before it can even be possible to reach the heliopause with a new probe. Regardless of these above conditions, it is essential to explore options for interstellar missions. Consequently, in the present, the dream of stars compels many scientists to work on interstellar missions even though it may not be possible to initiate such a mission with current technology. This paper discusses the possibility of an interstellar exploration mission to the recently discovered star system, Luhman 16. It is chosen due to the fact of being the second closest binary brown-dwarf system with possible exoplanet in the near interstellar space around our solar system. This star system lies at an approximate distance of 6.5 light years, thus presenting a good destination for interstellar travel. Hence, this paper will present a case study analysis of interstellar travel to Luhman 16 Star System by comparing different modes of viable propulsion systems in development; and plotting the distance, time and specific impulse for Gas-Core Nuclear 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 semi relativistic speeds will be considered along with the corresponding mass expansion and time dilation. The futurology of this paper lies in presenting the case study to become a reference point for similar unmanned interstellar missions.