

22nd IAA SYMPOSIUM ON VISIONS AND STRATEGIES FOR THE FUTURE (D4)
Strategies for Rapid Implementation of Interstellar Missions: Precursors and Beyond (4)

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ORBITAL PATH OF A SPACE PROBE IN ORDER TO ENTER INTO A STABLE ORBIT AROUND
A BINARY STAR SYSTEM

Abstract

Back in 1781, an accidental discovery in Germany paved the way for a catalogue of intriguing systems called the binary star system. In pursuit of learning about the spatial distribution of stars in the Milky Way galaxy and the measurements of their distances, astronomer William Herschel stumbled upon binary stars. Subsequently, more discoveries in this area followed and these led to an important result - about 85 exist in binary star system. A binary star system poses an interesting challenge of placing a probe in a stable orbit around it. It bends the spacetime fabric around it in a manner which is much more convoluted relative to the bend around a single star. The gravitational pull of the system as a whole varies in an intriguing periodic pattern. Exoplanets in a binary star system orbit in a loop around both stars, or so to say both foci of the planet's trajectory. Habitability on planets that orbit around binary star systems has been a burgeoning topic of research. Having the know-how and means to place a probe in a stable orbit around binary star systems, or more precisely in a circumstellar orbit will help mankind to learn about the nature, sciences and laws that govern motion around such a system. This will help us delve deeper into what resources and possibilities to expect in such an environment. Recent research has shown that binarity of protostars affects the evolution of the disk and planets. Moreover, research also indicates that there is high possibility of finding habitable planets around binary stars, but these planets would form differently than worlds around single stars. Such findings make probing of binary stars even more critical to the space industry and expand our understanding of what creates habitable situations. The magneto-hydrodynamic simulations around a binary star system helps in our understanding of forces as well as space-time bends around such a system, which will help us locate a safe orbit zone around them. Study of what holds exoplanets in orbit around the binary stars shall guide the study of stable orbits for probes. This paper focuses on such an interstellar mission and its parameters.