

FAR FUTURE (D4)
Human Exploration Beyond Mars/Interstellar Precursors Missions (1.-D4.3)

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THE “MAG-RING” CONCEPT AND OPENING THE SOLAR SYSTEM TO SUSTAINABLE HUMAN
EXPLORATION AND DEVELOPMENT

Abstract

A variety of concepts have been considered over the past six decades that might make possible the human exploration of space beyond Mars. Such ambitious future exploration mission concepts remain at the extreme edge of feasibility and require surmounting three distinct hurdles: (1) technical feasibility; (2) health and safety risks; and, (3) economic viability. These concepts typically involve nuclear technologies of one of three types: (1) low-thrust nuclear electric propulsion; (2) higher-thrust, but lower fuel-efficiency nuclear thermal propulsion; or, (3) high-thrust and high fuel-efficiency nuclear pulse propulsion. Unfortunately, although these approaches may surmount the hurdles of technical feasibility and health and safety risks, the costs of such systems are likely to be exorbitantly high under any tractable scenario for human exploration and activity beyond Mars. How then might such ambitious future space activities become economically viability?

This paper presents an alternative approach to human exploration of and activity across the solar system beyond Mars: the MagRing Concept. (The MagRing was first introduced at the 2006 International Astronautical Congress in Valencia, Spain, as a new approach to eventual interstellar flight.) The paper reviews the various options and summarizes the results of a high-level systems and technology assessment of several alternative approaches to human exploration beyond Mars, with an emphasis on issues related to sustainability and affordability. Finally, the paper discusses how eventual human access to the solar system beyond Mars could be pursued as part of an overarching stepping stone approach: beginning with the successful development of lunar resources and eventually reaching to the stars.