

The Journals

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Here we list recent interstellar-related papers in the **Journal of the British Interplanetary Society (JBIS)**, which has been published since the 1930s and in **Acta Astronautica (ActaA)**, the commercial journal published by Elsevier, with the endorsement of the International Academy of Astronautics.

Acta Astronautica

Acta Astronautica papers are published online before print. No interstellar-related papers have been found since our last issue, Principium P47, in final Acta Astronautica volumes up to #227 February 2025 and "in progress" volumes up to #229 April 2025.

JBIS

Three issues of JBIS, May, June and July 2024, have appeared since the report in our last issue. P47. May and June had interstellar-related papers.

JBIS VOLUME 77 #5 MAY 2024 Interstellar Issue		
Aerographite: a Candidate Material for Interstellar Photon Sailing	Gregory L Matloff & Joseph E Meany	USA
<p>Aerographite has been suggested in a recent paper as a possible candidate for interstellar photon sailing. This paper begins by presenting known properties of this extremely low density, light absorptive, material. After a review of analytical tools, a number of possible interstellar missions are then considered. The first confirms that a thin-film Sun-accelerated probe deployed at the 0.4-AU perihelion of an initially parabolic solar orbit could reach Proxima/Alpha Centauri after a voyage duration of about two centuries. The next case examined is a thin-film probe accelerated to about 0.033 c by an in-space laser array. Finally, it is shown that a combined aerographite-graphene hollow-body solar-photon sail may have significant advantages in accelerating a generation ship to an interstellar cruise velocity in excess of 900 km/s. Some of the unknowns regarding this substance that must be addressed before this material can be applied to interstellar sail application, including the closest feasible perihelion distance and aerographite performance in the space environment, are also discussed.</p>		
JBIS VOLUME 77 #5 MAY 2024 Interstellar Issue		
In the Hypothetical Scenario of an Interception of the Voyagers by an ETI Probe	Kelvin F Long	UK
<p>The Voyager 1 and 2 spacecraft were first launched in 1977 and have been travelling in deep space ever since. Currently they are outside of the solar heliosphere at a distance of approximately 163 and 136 AU respectively. The Voyager probes were also designed to carry a Golden Record in the case of contact with an extraterrestrial civilization or its representative robotic probe so that they may learn about humanity. In late 2023 the flight data subsystem on-board Voyager 1 began transmitting unusable data that differed from the usual data stream. An investigation by the engineers found that in fact the downlink transmission contained a readout of the entire system memory. In this paper we speculate on a hypothetical scenario where the data issue is indicative of an attempted forced downlink, to include command data, from a passing ETI probe that may have been curious about the Voyager 1 spacecraft origin, nature, function and purpose. This is not a claim that this was the cause, but more the construction of a scenario for the consideration of other probes that may be launched in the future.</p>		

JBIS VOLUME 77 #5 MAY 2024 Interstellar Issue**The Spider Stellar Engine: a Fully Steerable Extraterrestrial Design?****Clément Vidal****Belgium**

A long-lived civilization will inevitably have to migrate towards a nearby star as its home star runs out of nuclear fuel. One way to achieve such a migration is by transforming its star into a stellar engine, and to control its motion in the galaxy. We first provide a brief overview of stellar engines and conclude that looking for technosignatures of stellar engines has taken two roads: on the observational side, hypervelocity stars have been the target of such searches, but without good candidates. On the theoretical side, stellar engine concepts have been proposed but are poorly linked to observable technosignatures. Since about half the stars in our galaxy are in binary systems where life might develop too, we introduce a model of a binary stellar engine. We propose mechanisms for acceleration, deceleration, steering in the orbital plane and outside of the orbital plane. We apply the model to candidate systems, spider pulsars, which are binary stars composed of one millisecond pulsar and a very low-mass companion star that is heavily irradiated by the pulsar wind. We discuss potential signatures of acceleration, deceleration, steering, as well as maneuvers such as gravitational assists or captures.

JBIS VOLUME 77 #5 MAY 2024 Interstellar Issue**Constraints on Interstellar Sovereignty****Jacob Haqq-Misra****USA**

Human space exploration and settlement of other planets is becoming increasingly technologically feasible, while mission concepts for remote and crewed missions to nearby star systems continue to be developed. But the long-term success of space settlement also requires extensions and advances in models of governance. This paper provides a synthesis of the physical factors that will constrain the application of sovereignty in space as well as legal precedent on Earth that likely applies to any crewed or uncrewed missions to other stellar systems. The Outer Space Treaty limits the territorial expansion of states into space, but the requirements for oversight of nongovernmental agencies and retention of property ownership enable the extension of state jurisdiction into space. Pragmatic constraints from historical precedent on Earth suggest that new space treaties will be unlikely to succeed and new global space agencies may have limited jurisdiction over states, while hard constraints of the space environment require adherence to technical capabilities, political feasibility, and long-term sustainability. These factors form a three-prong test for assessing the viability of interstellar governance models. This discussion of interstellar governance is intended to further the conversation about sovereignty in space prior to the first intentional launch of any interstellar spacecraft.

JBIS VOLUME 77 #6 JUNE 2024**Research Progress Toward Engineering Feasibility of the Centrifugal Nuclear Thermal Rocket****Dale Thomas, Michael Houts, Dean Wang, Keith Hollingsworth, Robert Frederick & Jason Cassibry****USA**

The Centrifugal Nuclear Thermal Rocket (CNTR) is a Nuclear Thermal Propulsion (NTP) concept designed to heat propellant directly by the reactor fuel. The primary difference between the CNTR concept and traditional NTP systems is that rather than using traditional solid fuel elements, the CNTR uses liquid fuel with the liquid contained in rotating cylinders by centrifugal force. Research continues to determine resolutions for the significant engineering challenges that the CNTR concept presents, and this paper describes the advances resulting from the most recent analyses, simulations, and experiments. In particular, this paper describes strategies and key results to date on leveling the heat generation gradient in the liquid uranium annulus through use of a burnable poison. Coupled with the significantly improved power gradient, inclusion of a ZrC liner allows significant higher core operating temperatures and yields significantly improved performance estimates. Progress is also described for the 3D modeling of the gaseous hydrogen bubbles in the liquid uranium and experimental results on gaseous and liquid analogs to validate the analytical models. Finally, mission analyses are described for scientific missions to various Solar System destinations including Jupiter and Kuiper belt objects Pluto and Quaoar.