

# The Journals

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

## JBIS

Three issues of JBIS (December 2021, January and February 2022) have appeared since the General Interstellar Issue in November 2021. We have found no new papers of interest to interstellar studies. However the following has been published online -

Title (open publication)	Author	Affiliation
Abstract/Précis/Highlights		
online arxiv.org JBIS VOLUME 75 NO.2 February 2022		
Engineering an Interstellar Communications Network by Deploying Relay Probes	John Gertzl & Geoff Marcy	Zorro Productions & Space Laser Awareness, USA
We develop a model for an interstellar communication network that is composed of relay nodes that transmit diffraction-limited beams of photons. We provide a multi-dimensional rationale for such a network of communication in lieu of interstellar beacons. We derive a theoretical expression for the bit rate of communication based on fundamental physics, constrained by the energy available for photons and the diffraction of the beam that dilutes the information by the inverse square law. We find that meter-scale probes are severely limited in their bit rate, under 1 Gbps, over distances of a light year. However, that bit rate is proportional to the 4th power of the size of the optics that transmit and receive the photons, and inversely proportional to the square of the distance between them, thus favoring large optics and short separations between nodes. The optimized architecture of interstellar communication consists of a network of nodes separated by sub- light-year distances and strung out between neighboring stars. ( <a href="https://arxiv.org/ftp/arxiv/papers/2204/2204.08296.pdf">arxiv.org/ftp/arxiv/papers/2204/2204.08296.pdf</a> )		

## Acta Astronautica

Title	Number+date	Author	Affiliation
<b>Abstract/Précis/Highlights</b>			
Deceleration of Exoplanet Missions Utilizing Scarce Antimatter	Available online 16 March 2022	Gerald P Jackson	Hbar Technologies, USA
<p>Antimatter-based propulsion for unmanned exploratory missions to exoplanets in such solar systems as Proxima Centauri and Epsilon Eridani.</p> <p>Deceleration of the spacecraft is accomplished by inducing fission of uranium-238 with antiproton annihilations.</p> <p>A low mass propulsion system is matched to a comparably low mass spacecraft architecture.</p> <p>Mission profiles emphasizing early science results are presented due to the long transit time to nearby solar systems.</p> <p>Antimatter production improvements and economics are enabling issues.</p>			
Pulsed plasma rocket-developing a dynamic fission process for high specific impulse and high thrust propulsion	Available online 17 March 2022	Steven D Howe, Troy Howe, Francesca G Bennett, Nathan Blaylock, Gerry Jackson, Jason Cassibry	Howe Industries, USA
<p>The Pulsed Plasma Rocket (PPR) is an advanced nuclear propulsion concept that uses a fission-based nuclear power system to rapidly cause a phase change in a fuel projectile from solid to plasma during a pulsed cycle. To create the plasma bursts that provide thrust, a highly moderated Low Enriched Uranium (LEU) projectile can be used in combination with an unmoderated LEU barrel to preferentially heat the projectile. A short section of High Enriched Uranium (HEU) at the barrel base, along with a novel control drum mechanism, allows for controlled and rapid neutron population growth to transition into a plasma state in a fraction of a second. The PPR concept is intended to provide fast transit to and from locations such as Mars, with the engine capable of providing 100,000 N of thrust and 5,000s of specific impulse. The pulsed plasma rocket is a revolutionary new technology that is much more efficient than traditional rocket engines. It creates a plasma field that can be used to generate thrust, allowing spacecraft to travel much faster and farther than traditional rockets. This technology is essential for future space exploration, as it will allow us to travel to other planets and moons in the solar system.</p>			
Life beyond Earth: How will it first be detected?	Available online 6 April 2022	Chris Impey	University of Arizona
<p>The search for life beyond the Earth is being carried out using a variety of techniques in three distinct realms of space.</p> <p>The best near-term prospect for the detection of life is the detection of biomarkers in exoplanet atmospheres.</p> <p>The next best prospect will come from the search for relic traces of life in ancient Mars rocks returned to the Earth.</p> <p>The strategy least likely to succeed, having indeterminate odds of success, is the search for extraterrestrial intelligence.</p> <p>The discovery of life beyond Earth, when it comes, will be one of the most important in scientific history.</p>			

Interstellar probe - Destination: Universe!	# 196, July 2022	Ralph L McNutt Jr (*), Robert F Wimmer-Schweingruber (University of Kiel), Mike Gruntman (University of Southern California), Stamatios M Krimigis (* / Academy of Athens), Edmond C Roelof (*), Pontus C Brandt (*), Steven R Vernon (*), Michael V Paul (*), Robert W Stough (NASA Marshall Space Flight Center), James D Kinnison (*)	*The Johns Hopkins University Applied Physics Laboratory
<p>An "Interstellar Probe" has been discussed in depth for almost 60 years. The results of a four-year long engineering, science, instrumentation, and implementation trade study for NASA are summarized.</p> <p>"Best" solutions are assessed and compared.</p> <p>Over 100 mission approaches using NASA's large new SLS super heavy-lift launch vehicle are quantified and assessed.</p> <p>Implementation costs are estimated and an example cost-loaded implementation schedule is published for an example mission.</p>			
Quantitative characterization of photonic sail candidates using nanocantilever displacement	Available online 10 March 2022	Joseph E Meany	Savannah River National Laboratory, USA
<p>Laser sources irradiating cantilever systems lead to measurable force deflection.</p> <p>Quantify spectral characteristics of light sails for mission qualification.</p> <p>Sail candidate materials may be directly tested for failure.</p> <p>Requires swatches on the order of <math>\mu\text{m}^2</math>.</p> <p>Allows for high-throughput iteration.</p>			
Wind-pellet shear sailing	Available online 25 April 2022	Jeffrey K Greason (TZF) Dmytro Yakymenko & Mathias N Larrourou (Electric Sky Inc) Andrew J Higgins (McGill University)	Tau Zero Foundation (TZF)
<p>A new concept is proposed: a spacecraft overtakes pellets, transferring their energy to the spacecraft. The concept exploits the use of free energy sources available in space.</p> <p>Analysis suggests spacecraft may be accelerated from 2% to 5% of the speed of light.</p> <p>The technique may be combined with other propulsion devices to achieve greater speeds.</p> <p>A mission to return data from nearby stars within 30 years of launch may be possible.</p>			