

News Feature: The Journals

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Principium has been logging interstellar papers published in the Journal of the British Interplanetary Society (JBIS) for some years. In this issue we also log interstellar papers in Acta Astronautica (ActaA), the commercial journal published by Elsevier, with the endorsement of the International Academy of Astronautics. On this first occasion we have aimed to capture ActaA papers in the current year so far. Subsequent Principium issues will add relevant papers published in later issues of ActaA.

Title (open publication)	Author	Affiliation
Précis/Highlights		
JBIS 74.6 Jun 2021	General Issue	
Terraforming the Dwarf Planet: Interconnected and growable Ceres megasatellite world (https://arxiv.org/abs/2011.07487)	Pekka Janhunen	Finnish Meteorological Institute
A megasatellite settlement built from Ceres materials in high Ceres orbit, local nitrogen for an earthlike atmosphere, 1 g artificial gravity spinning habitats attached to a disk-shaped megasatellite frame by passively safe magnetic bearings, habitats illuminated by concentrated sunlight from planar and parabolic mirrors. Mass per person is 10 ⁷ kg mostly radiation shield and soil lifted from Ceres by space elevator exploiting its fast rotation. The result would be a long-term sustainable world with propellantless intra-settlement travel.		
Space Colonies: An Alternative to the Globus Cylinder (no open publication)	Mark Hempsell	Hempsell Astronautics Ltd
Globus argues for a cylinder with a height 1.3 times the floor radius as optimum overall shape for a large spinning space habitat thus minimising overall wall area, maximising floor area while maintaining an inertia ratio compatible with stable spin. We look at the impact of using a roof to create a hollow cylinder, reducing the pressurised volume for a given usable floor area and find structural mass differences are small and secondary factors would have a larger influence. So selection would be based on saving in mass of atmosphere and aesthetic of overhead sky.		

The Journal of the British Interplanetary Society uses a distinctive red design for interstellar issues.



JBIS 74.7 Jul 2021	General Interstellar Issue	
Of Aliens and Exoplanets - Why the search for life, probably, requires the search for water (https://arxiv.org/abs/2104.01683)	Darius Modirrousta-Galian & Giovanni Maddalena	Osservatorio Astronomico di Palermo & University of Edinburgh
It is not currently possible to create a living organism ab initio, how biological organisms form from non-living matter is unknown. So some researchers have taken water out of their models and opted for more exotic approaches. Such assumptions have strong implications for astronomical observations and future space exploration. By breaking down water properties to the physical, chemical and biological level it is demonstrated to be the most adequate medium for the formation of life.		
Minimal Crew and Human Evolution in Multi-Generational Interstellar Travel - based on population genetics (no open publication)	Sano Satoshi	Japan Aerospace Exploration Agency
Defining crew size previously published computations provided critical crew numbers considering inbreeding and infertility, but not including population genetics parameters such as mutation and genetic drift but spaceship capacity is equally important as initial crew size. Presenting a Monte Carlo code, EVOLVE, to estimate critical crew size, spaceship capacity, including genetic parameters. Showing that a crew of a few hundred people can reach the destination without facing extinction but a genetically healthy crew requires minimum crew size of 1,900-2,000. Also estimating possibility of human evolution during travel, possibly affecting spaceship design.		
Furthering a Comprehensive Seti Bibliography (https://arxiv.org/abs/2107.02887)	Julia LaFond, Jason T Wright & Macy J Huston	Pennsylvania State University
Reyes & Wright 2019 used NASA Astrophysics Data System (ADS) to initiate a comprehensive public SETI bibliography but updates have been incomplete. In preparation for a recent update, the scope of the library was revised and reexamined to include social sciences and commensal SETI. A curated library of false positive results is now concurrently maintained to facilitate their exclusion from future searches. A search query and workflow was developed which will enable efficient, consistent updates of the SETI library by future curators.		
The Drake Equation at 60: reconsidered and abandoned (https://arxiv.org/abs/2105.03984)	John Gertz	Zorro Productions, Berkeley, CA
Each of the individual factors of the Drake Equation is considered and each either abandoned or redefined. Finally reduced to a single new factor, f_d , the fraction of technological life that is detectable by any means. But neither the Drake Equation, nor its replacement, can solve for N. Only SETI and, ultimately, alien contact can result in the determination of N.		
Anomalous Stellar Acceleration: causes and consequences (no open publication)	Roman Ya Kezerashvili, Gregory L Matloff & Kelvin F Long	New York City College of Technology & Stellar Engines Ltd, UK
Analysis of the first data release from the ESA Gaia space observatory in 2018 yielded surprising results - most stars in our galactic vicinity are considerably older than our Sun and stars apparently accelerate in galactic revolution by ~1 km/s per billion years. Here some possible modes of stellar acceleration are suggested, discussed and evaluated - unidirectional stellar electromagnetic flux, accelerated stellar winds, galactic cannibalism, coronal mass ejections, unidirectional stellar neutrino flux, and thermal nuclear fusion of stellar winds. The accelerated unidirectional stellar wind and the unidirectional stellar neutrino jet in conjunction with the unidirectional photon jet ejected from the star and non-isotropic stellar wind can yield the stellar linear momentum change required. Some of these acceleration mechanisms may provide evidence of the technosignatures of advanced galactic civilizations.		

Acta Astronautica		
Near-term self-replicating probes - A concept design (arxiv.org/abs/2005.12303)	Olivia Borgue, Andreas M Hein	i4is
<ul style="list-style-type: none"> ▪ Self-replicating probes may enable exponentially accelerating space exploration ▪ We present a concept for a near-term self-replicating probe ▪ At least 70% of its dry mass can be replicated ▪ Operations would be limited to the inner solar system ▪ A technology roadmap for achieving full replication and interstellar exploration 		
Exploration of trans-Neptunian objects using the Direct Fusion Drive (arxiv.org/abs/2009.12633)	Marco Gajeria, Roman Ya Kezerashvili	Politecnico di Torino, NYC College of Technology
<ul style="list-style-type: none"> ▪ The Direct Fusion Drive is a revolutionary space propulsion system. ▪ The Direct Fusion Drive is based on the D³He nuclear fusion reaction. ▪ Fast rendezvous missions to trans-Neptunian objects are analyzed. ▪ The Direct Fusion Drive is a first practical approach to interstellar travel. ▪ Several scenarios to study the heliosphere up to 125 AU are presented. 		
A joint mind consideration of the Drake equation in the search for extraterrestrial intelligence (no open publication)	Leslie M Golden	University of Illinois, Chicago
A Monte Carlo analysis to determine the most likely value of the six non-longevity factors (based on random variables and estimates from six studies) in the Drake equation. Results in moderately close agreement with the estimate by both Frank Drake and the Cyclops report.		
Strategies and advice for the Search for Extraterrestrial Intelligence (arxiv.org/abs/2107.07283)	Jason T Wright	Pennsylvania State University
<ul style="list-style-type: none"> ▪ Overview of observational strategies for SETI. ▪ Rough map of the landscape of possible technosignatures. ▪ Discussion of the importance of and strategies for placing upper limits on technosignatures. ▪ Recommendations for those seeking to enter the field. 		
ESA F-Class Comet Interceptor: Trajectory design to intercept a yet-to-be-discovered comet (arxiv.org/abs/2107.12999)	Joan Pau Sánchez <i>et al</i>	Cranfield University, UK
<ul style="list-style-type: none"> ▪ Comet-I mission aims to explore a Long Period Comet; ideally, dynamically new. ▪ Such a target will remain unidentified, possibly, even after launch. ▪ The paper analyses the orbital space that will be accessible for Comet-I S/C. ▪ Chemical, electric and hybrid propulsion systems are modelled in patched-conic. ▪ A Monte Carlo analysis shows a 95–99% of completing the mission within 6 years. 		
Experimental investigation of Mach-Effect thrusters on torsion balances ([2])	Maxime Monette, Matthias Kößling, Martin Tajmar	Technische Universität Dresden
<ul style="list-style-type: none"> ▪ Claim on Mach-Effect propellantless propulsion scheme identified as vibration artefact. ▪ Investigation of material- and electronics-related setup issues. ▪ 1D balance model and simulations of conditions that lead to false thrust signals. 		
Metalaw – What is it good for? (no open publication)	Michael Bohlander	Durham Law School, UK
Aims to critique the intellectual foundations of the metalaw debate about relations with ETI - avoiding anthropocentrism in deontology/Kant's Categorical Imperative, considering diverse scenarios of contact, recognising the expected realpolitik environment.		

[1] 2021 editions - search - <https://www.sciencedirect.com/search?q=interstellar&pub=Acta%20Astronautica&cid=271447&date=2021&years=2021&lastSelectedFacet=years>

[2] https://www.researchgate.net/profile/Martin-Tajmar/publication/349845653_Experimental_investigation_of_Mach-Effect_thrusters_on_torsion_balances/links/6049ddfb45851543166ba416/Experimental-investigation-of-Mach-Effect-thrusters-on-torsion-balances.pdf