The Journals

John I Davies

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.

JBIS

Three issues of JBIS, February, March and April 2024 have appeared since the report in our last issue. P46. The April issue is in print but not yet online. The entries below are scanned from the print issue.

JBIS VOLUME 77 #4 APRIL 2024 Interstellar Issue		
Faster-than-Light Travel from Dark Energy Inflation	**J A Morgan**	**USA**
The mass-energy content of the present-day universe is dominated by an exotic component known as dark energy. In its earliest stages, a similar dominant component drove the exponential growth of cosmological inflation. This note explores how a sufficiently advanced civilisation might manipulate dark energy for faster that-light travel. An exact solution of the Einstein gravitational field equations that experiences highly anisotropic inflation serves as a toy model to illustrate the principles. A sample calculation exhibits highly superluminal motion while imposing negligible stress on a spacecraft hull.		

JBIS VOLUME 77 #4 APRIL 2024 Interstellar Issue		
Frank Drake is Alive! (Rethinking the Drake Equation For the Search For Biological Life)	**Elio Quiroga Rodriguez**	**Universidad del Atlantico Medio, Spain**
In 1961, astronomer Frank Drake formulated the Drake Equation as a cornerstone for scientific discourse regarding the prevalence of communicative extraterrestrial civilizations within the Milky Way galaxy. This equation, often referred to as the "Classic Drake Equation' outlines the key factors influencing the number of potential civilizations with which we might establish communication. This article submerges into the Drake Equation and proposes a simplified version focused on the broader detection of extraterrestrial non-intelligent life. The established terms of the equation, such as the rate of stellar formation, the fraction of stars harboring planetary systems, and the probability of such systems containing habitable planets, are re-examined and discussed. Additionally, a re-evaluation of other factors is presented. Based on this revised framework, various scenarios are explored. As our technological capabilities continue to advance, the detection of biosignatures on exoplanets (incorporated into the suggested new version of the equation) is anticipated to offer insights into the search for life beyond Earth.		

JBIS VOLUME 77 #4 APRIL 2024 Interstellar Issue		
Inertial Confinement Fusion Propulsion for the Massive Ra World Ship Model — Part 2	**Kelvin F Long**	**Interstellar Research Centre, UK**
A strategy for sending humans around other stars will be to acquire the ability to construct large World Ships which are of order ~10^{11}-10^{12} tons in mass, ~100 km in length and host large populations of millions of people over many generations of lifetime. This paper presents such a concept but driven by inertial confinement fusion engines utilising very large pellets of order 230 g in mass augmented with 4.85 kg/pellet of expellant propellant for increased mass flow rate and thrust generation. A mission architecture is constructed for a 1 million population carrying capacity growing to 10 million, based on an original 1984 published model which achieved a cruise speed of 1,500 km/s or 0.5% c for a 1,000 year trip time. Calculations show that propulsion of such a vast construction will require hundreds of engines operating in parallel thrust mode and at moderately high pulse frequency for an elongated burn time of order half a century. The purpose of this study was to examine whether it was possible to drive an interstellar world ship using ICF engines using similar assumptions to a 1984 study for a Mk2A design. The conclusion of this study is that although an architecture does appear to be possible, there are practical reasons why it may be better to pursue alternative propulsion methods for this specific application such as via external nuclear pulse propulsion as adopted for the original studies. This paper is a follow-up to an earlier one which discussed some of the assumptions of the study.		

Acta Astronautica

Acta Astronautica papers are published online before print. These issues with relevant papers have appeared since our last issue, Principium P46.

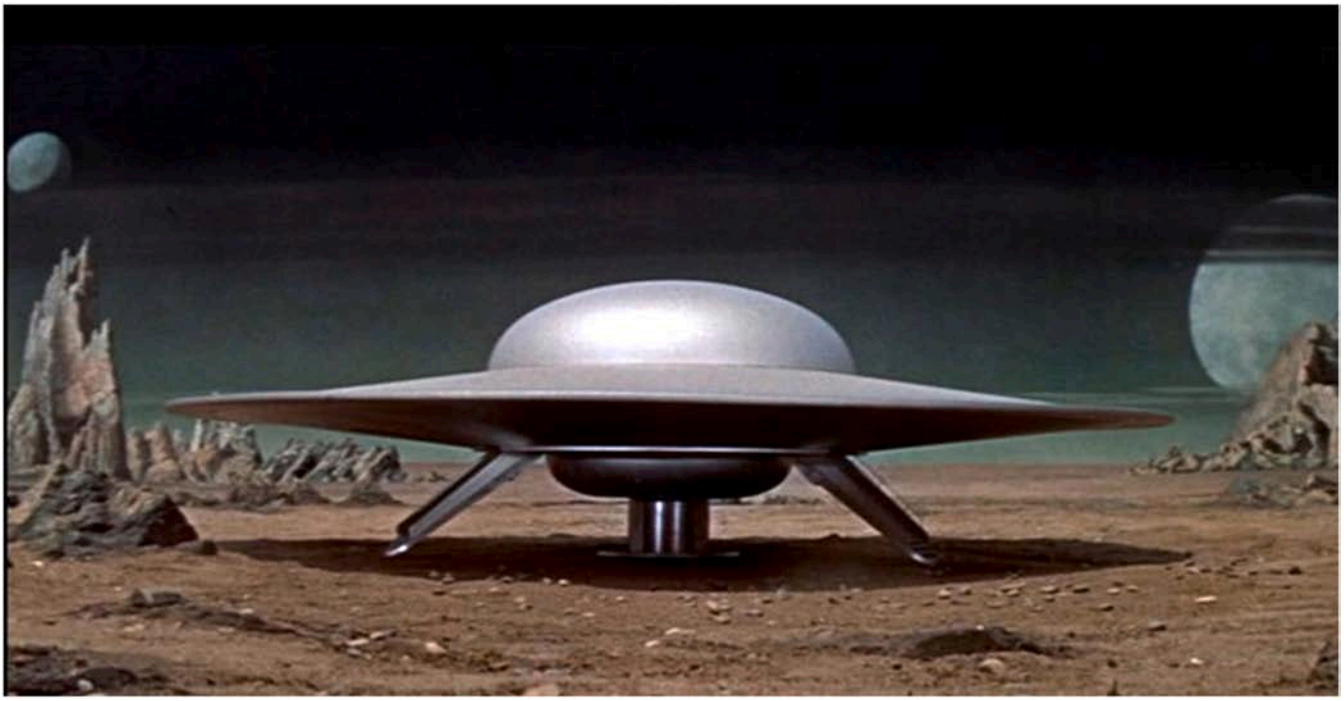
SETI in 2022	**Volume 225 December 2024**	**Jason T Wright et al**
In this third installment of SETI in 20xx, we very briefly and subjectively review developments in SETI in 2022. Our primary focus is 80 papers and books published or made public in 2022, which we sort into six broad categories: results from actual searches, new search methods and instrumentation, target and frequency selection, the development of technosignatures, theory of ETIs, and social aspects of SETI.		

Bremsstrahlung power conversion for fusion power and propulsion in space	**Volume 220 July 2024**	**Thomas Bone, Raymond Sedwick**
Centrifugally confined Direct Fusion Drive propulsion has the capability of greatly advancing humanity's ability to traverse and explore the solar system. p-11B is a promising fusion fuel to use in such a system because the reaction is aneutronic. However, a large amount of bremsstrahlung radiation is produced and must be converted into electricity to power the electric field used to help confine the fusion plasma. This work details an idealized analytical model to determine the viability of using a thermionic energy converter for this purpose. The model finds a maximum power density of 10^5 W/m^2 with a Carnot efficiency of 30%. The required electric and magnetic fields to produce net positive fusion power are > 350 MV/m and ~ 30 T respectively. This data is then used to discuss the feasibility of using p-11B as a fusion fuel for Direct Fusion Drive.		

Interstellar exploration: From science fiction to actual technology	Volume 222 September 2024	Giancarlo Genta

The technology for even the most advanced missions in the solar system doesn't need advances in basic science. Travelling through the solar system can be described through what is called 'hard science fiction', ie science fiction strictly based on scientific knowledge. Interstellar exploration is a completely different matter. Robotic flyby missions to the nearest stars using nanoprobes can be performed using technologies based on known science, while anything beyond this requires advances which we don't know how to implement, or even we are not sure whether they are possible at all. The point applies not only to the technological aspects but even the scientific bases on which the relevant technologies may rest. The missions requiring less scientific-technological advances, are slow missions, like space arks (generation ships) or missions based on hibernation with travel times up to hundred years. To implement both, the uncertainties are more related to the advances in space medicine and biology than in propulsion and physics. The fastest travels allowed by the current interpretations of the relativity theory are relativistic missions in which the time contraction at speeds closing the speed of light is exploited to decrease the travel time for the astronauts, although the travel time seen by those who remain on Earth is close, in years, to the distance traveled expressed in light years. However, the energy required for this type of missions is large and grows drastically with the increase of time contraction.

Faster than light travel, which seems to be possible following some interpretations of relativity involving either wormholes or some sort of warp drive, requires substantial advances in fundamental physics. A symptom of this is that the novels dealing with interstellar travels belong more to the space opera – which doesn't follow strict scientific credibility – than to the hard science fiction subgenre. No novel of this kind explains details about how the relevant machinery works, and even less scientifically realistic are the movies, TV series, and video-games of this kind. Moreover, to achieve a travel time allowing to reach distant star systems in reasonable times using warp drives, the authors of Star Trek had to resort to the Warp Factor which is essentially a nonlinear scale. This makes the requirements for FTL travel even more difficult to achieve.



The star cruiser C57D landed on Planet Altair 4 in the movie Forbidden Planet (1956). It was the first high-budget SF movie dealing with an interstellar journey performed at FTL speed. The original trailer recited: "Today. Man prepares to take his first steps outward into space – Tomorrow he will explore the stars. MGM's great technical staff brings you a magnificent picture of the distant tomorrow".
Note that this was the year before the launch of the first satellite, Sputnik 1. It was a great success.

Credit (image and caption): Giancarlo Genta Fig 1.