

i4is 10th anniversary

The Initiative for Interstellar Studies founded 2012

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i4is 10 year anniversary - Major achievements

i4is has celebrated its 10-year anniversary in 2022. This is a good point in time to reflect on our achievements towards the interstellar vision. The list is long and a short article like this will not do justice to what the team has achieved. Our benchmark is ambitious: In the long-run, i4is' success will be judged on how far it contributed to create an interstellar-capable civilization. How far did we contribute to this ambition over the last 10 years? I would like to structure our achievements in terms of community-building, education and technical achievements.

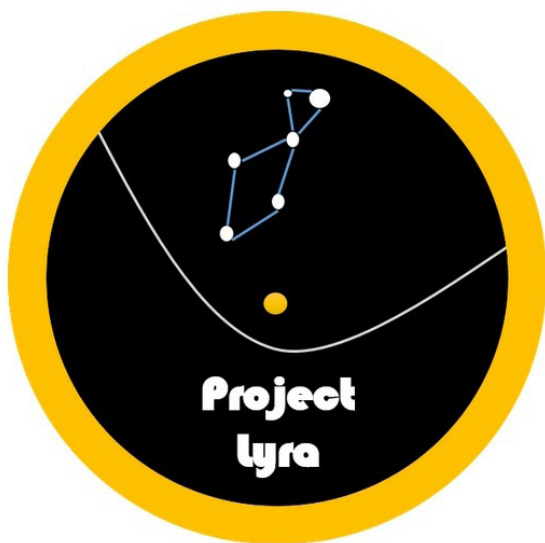
Community-building

What have we done that contributed to entertaining an interstellar community? There are a number of contributions such as Principium (past editor Keith Cooper, now John Davies), which has remained for now 40 issues the main regular outlet, focusing uniquely on interstellar travel. Contributions to the Foundations of Interstellar Studies Workshop, to the Tennessee Valley Interstellar Workshop (now the Interstellar Research Group, irg.space), ESA Interstellar Workshop, Breakthrough Discuss and numerous other events. Community-building also means bringing people together longer term to work on projects. I will come back to this point later, in the section on technical achievements.



◀ Education

Over the last decade our educational program has evolved from an initial interstellar summer school to a fully fledged week-long interstellar curriculum in collaboration with the Limitless Space Institute, under the leadership of Rob Swinney (Director of Education Committee). In addition, we have given two-week modules and individual lectures for several years at the International Space University (ISU, www.isunet.edu/). Notable interstellar modules were the World Ship module (three times) and the ChipSat module (the first ever on these gram-sized spacecraft). These two-week modules combine teaching and group activities which result in a final presentation and a research article. In addition, our team co-supervised a handful of Individual Projects (IPs) of ISU MSc students, which in their majority have led to papers and presentations at the International Astronautical Congress (IAC) and a few even to peer-reviewed journal papers. Our educational activities are, however, not limited to university students. We have been contributing regularly to the Royal Institution in the UK via the “Skateboards to Starships” programme, targeting high school students. Hundreds of students have been introduced to interstellar travel via our courses and supervision and many of them now working in the space industry.



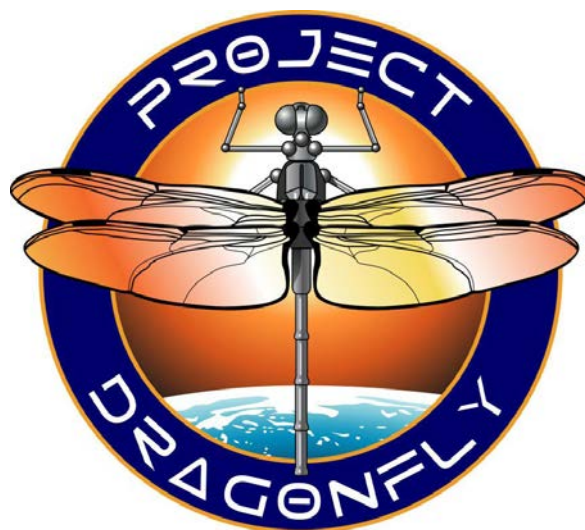
Technical

Looking at the last 10 years, some technical achievements stand out. In the following, I would like to focus on two, as they have historical implications for the field of interstellar travel.

First, Project Lyra, an ongoing research project to investigate missions to interstellar objects. This has probably been the most prominent technical project of i4is in terms of media appearances but also in terms of number of publications. It is the more remarkable that this project was purely serendipitous with the unforeseen discovery of 1I/'Oumuamua in October 2017. Just weeks after its discovery, a team formed and released a first paper on a mission to 1I on arXiv, refuting the current view that a mission was infeasible. In the months and years afterwards a team of international researchers from multiple institutions [1] formed, publishing papers on this topic since then. The set of targets has expanded from 1I to 2I/Borisov to different (hypothetical) classes of interstellar objects, Planet 9, and nomadic worlds (aka rogue planets). Project Lyra has thereby expanded the scope of what interstellar travel is by looking at the space between the stars: Interstellar objects and nomadic worlds allow us to explore other star systems without flying to them. Besides nine peer-reviewed journal papers, Project Lyra has been featured in hundreds of articles (National Geographic, Forbes, NBC, etc) and videos (~6 million views).

[1] Florida Institute of Technology, Paris Observatory, Technical University of Munich, Aachen University of Applied Sciences, Space Initiatives Inc etc.

A second and another to a certain extent serendipitous achievement is Project Dragonfly, a project focusing on small, laser-driven interstellar probes. The idea evolved from conversations with Greg Matloff in early 2013 to internal discussions, preliminary works, and a workshop at the British Interplanetary Society (BIS) towards the organization of a competition in 2014-2015 where 4 international student teams participated (www.centauri-dreams.org/2015/07/17/small-interstellar-probes-riding-laser-beams-the-project-dragonfly-design-competition-workshop/). Accompanied by a Kickstarter campaign to financially support the travel expenses of the students, a final workshop was organized in the premises of the BIS in July 2015, where the teams presented their designs.



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While the winning team was from the Technical University of Munich, the 3rd placed team was from the University of California, Santa Barbara (UCSB), under the supervision of Phil Lubin. It turned out that the design of that particular team then evolved into the baseline architecture for Breakthrough Starshot, which was announced in April 2016.

According to later accounts (www.centauri-dreams.org/2018/10/05/de-star-and-breakthrough-starshot-a-short-history/) of Phil Lubin, his ideas on small laser-driven interstellar probes emerged around the same time as ours, which is a remarkable coincidence. Why did the UCSB team not win? In hindsight, our competition requirements did not necessarily reward teams which would go to extremes in terms of miniaturization, as science instrument mass was to be maximized, given a fixed 100 GW of beaming power. This explains to a certain extent the outcome of the competition, where teams with larger probes were at an advantage. If we would have gone for simultaneously minimizing the cost of the mission and maximizing science output, some teams might have taken a similar route of extreme miniaturization, trading a lower science output against lower cost. Although we were pondering ideas of miniaturizing interstellar sailcraft, we were rather thinking about CubeSat-scale spacecraft (www.centauri-dreams.org/2014/09/05/project-dragonfly-the-case-for-small-laser-propelled-distributed-probes/) with a mass of a few kg. Our assumption back then was that it would not be possible to transmit a meaningful amount of data back and we would not be able to acquire meaningful science data with a smaller spacecraft.

We do not want to forget about other achievements during the last 10 years and will continue to report on some of them in later Principium issues.