

ESAIL

Electric sail propulsion technology

SSF TRANSPORTATION

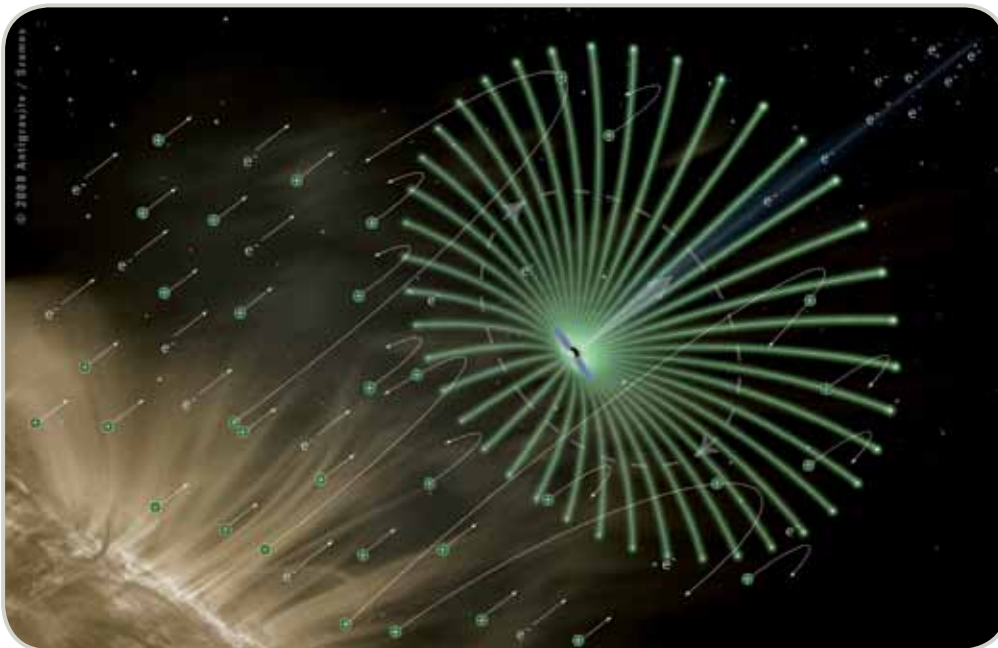
Just like the wind took Europeans to America in the past, in the future the solar wind may take European spacecraft to new worlds. The Electric Solar Wind Sail (ESAIL) project is set to develop a prototype for a new kind of spacecraft powered by the solar wind.

Outside Earth's magnetosphere there is a different kind of wind; the solar wind consists of a stream of charged particles that are ejected from the Sun. This wind mostly consists of electrons and protons that have escaped the Sun's gravity because of their high kinetic energy, or motion. Harvesting the power of this natural source of energy may pave the way for a very different kind of spacecraft, smaller, lighter and faster than those powered by fuels, which has the potential to take space missions further all the way to the heliopause where the solar wind is believed to end at the outer limit of our solar system.

The E-sail project sets out to harvest the power of the solar wind, as it aims to develop this enabling technology to a prototype level, which would allow for a decision to build and fly a first E-sail demonstration mission. It is estimated that E-sail technology would have the potential to improve state-of-the-art space propulsion systems by two to three orders of magnitude, whilst also being a truly green means of space transportation. Substituting fuel for in-space propulsion powered by the solar wind paves the way for lighter and less costly space missions. Because of their reduced mass, such missions would also be environmentally sound, as much less chemical propellant would need to be burnt to take them through Earth's atmosphere and into space.



PEKKA JANHUNEN
IS PROJECT COORDINATOR



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ESAIL will develop prototypes for the key components of a new space propulsion system - the electric sail, E-sail powered by the solar wind.

QUESTIONS & ANSWERS

What do you want to achieve with this project?

We want to advance the electric sail concept to laboratory prototype level so that the method could be thereafter tested in its authentic environment, that is, in the solar wind.

Why is this project important for Europe?

Compared to the prospects offered by electric sail propulsion, our present methods to move around in the solar system are slow, limited and expensive. The electric sail could open up the scientific and economic treasures of the solar system in an unforeseen way.

How does your work benefit European citizens?

We will be thrilled by the new science prospects: e.g. sample return from many targets and measurements in the interstellar space. The electric sail may also enable asteroid resource utilisation that could be used e.g. to help the construction of large solar power satellites.

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LIST OF PARTNERS

- Ilmatieteen laitos, Finland
- Helsingin yliopisto, Finland
- Jyväskylän yliopisto, Finland
- Deutsches Zentrum für Luft- und Raumfahrt, Germany
- Uppsala Universitet, Sweden
- NanoSpace, Sweden
- Tartu Observatory – Estonian Ministry of Education and Research, Estonia
- Università di Pisà, Italy
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PROJECT INFORMATION

Electric sail propulsion technology (ESAIL)
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