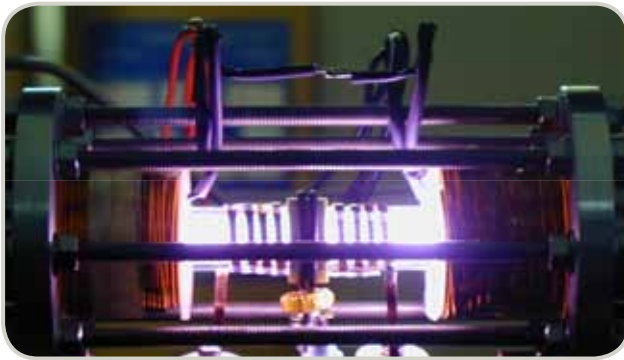


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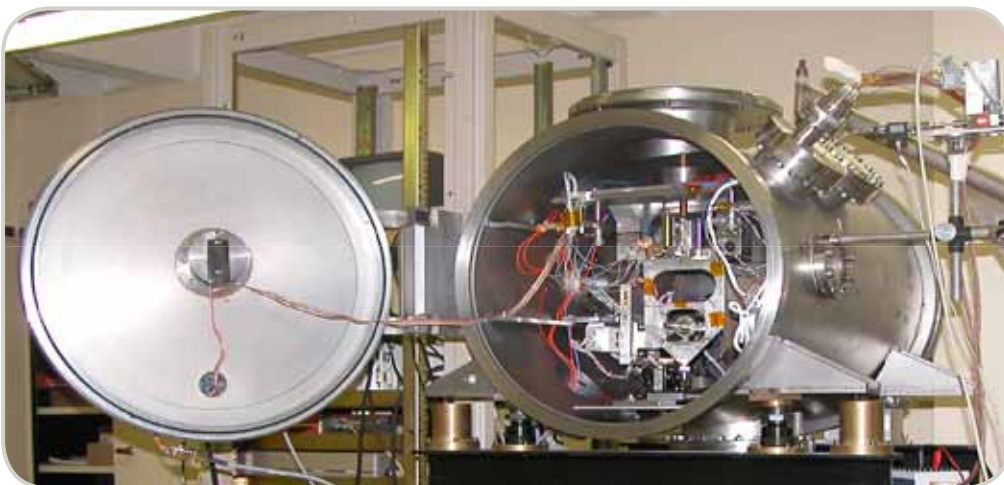
TOWARDS THE NEXT GENERATION OF SPACECRAFT

A new age of space travel is approaching. The bulky rockets of yesteryears may be replaced by new electric engines allowing more flexible use while using less fuel. These high-efficiency engines could pave the way for bigger payloads at lower cost, significantly enhancing mission capabilities. The HPH.com project aims at making an important step forward in this field.



Plasma source.
Source: HPH.com

Using the same engine for small manoeuvres and for long trips makes sense on Earth, but what about with spacecraft? In fact, **most spacecraft today use separate propulsion systems for making fine adjustments and major orbit changes.** The project HPH.com strives to simplify this situation, by developing a more flexible engine which is capable of doing both.



Helicon source based plasma thrusters are very promising, potentially reducing cost and enhancing reliability.
Source: © HPH.com

The first step will be the **development of an engine – or thruster - using low frequency radio waves (helicons)** to create plasma, which is expelled out the back using a magnetic nozzle to push the spacecraft forward. A prototype will be built and incorporated into a test microsatellite for attitude and position control, demonstrating its applicability in space.

Next, the feasibility of using the plasma to heat a secondary propellant (such as ADN/HADN, HAN, HFN, Neutral Gas) will be investigated. The resulting **two-mode thruster** would be able to operate in both a high efficiency – low thrust mode, using only the plasma component, and a low efficiency – high thrust mode using both.

The result could be a **versatile, multipurpose propulsion system capable of making both fine adjustments in spacecraft attitude and larger orbital changes.** Since current spacecraft tend to use separate systems for this, the inherent simplicity of using just one, combined with the high efficiency of plasma propulsion, holds the perspective to translate into a longer operational lifetime, enhanced reliability and lower cost.



DR. DANIELE PAVARIN
IS PROJECT COORDINATOR

QUESTIONS & ANSWERS

What do you want to achieve with this project?

The objective of the research program is to design, optimize and develop a new type of space plasma thruster based on helicon-radio-frequency technology, which allows for higher versatility and lower costs compared with current systems.

Why is this project important for Europe?

This program is intended to increase the performance level and capability of future propulsion systems. Such enhanced performance makes new mission scenarios possible, enhancing European strategic non-dependence.

How does your work benefit European citizens?

This technology will allow for bigger payloads, leading to increased “mission capabilities” in new mission scenarios; hence new services at lower costs. Moreover, this technology could be applied to other industries, strengthening the competitive advantage of European companies.

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- Office national d'études et de recherches aérospatiales (ONERA), France
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- Thales Alenia Space Italia S.p.A. (TAS-I), Italy
- Ente per le Nuove Tecnologie, l'Energia e l'Ambiente (ENEA), Italy
- National Aerospace University Kharkiv Aviation Institute (KhAI), Ukraine
- Universidad Politécnica de Madrid (UPM), Spain
- Alma Mater Studiorum - Università degli Studi di Bologna (UNIBO), Italy
- Keldysh Institute of Applied Mathematics of the Russian Academy of Sciences (KIAM), Russia
- Advanced Operations and Engineering Services Group B.V. (AOES), The Netherlands
- LMS Imagine S.A. (IMAGINE), France
- Roving A/S (ROVSING), Denmark
- Bradford Engineering B.V. (BRADFORD), The Netherlands
- Studio Progettazione e Realizzazione di Apparati Elettronici di Selmo Antonio (RESIA), Italy
- Centre national de la recherche scientifique - Laboratoire de physique des gaz et des plasmas (CNRS-LPGP), France

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PROJECT INFORMATION

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