



Welcome to the ASPIRE project!

ASPIRE is an EU Horizon 2020 project that aims at developing a Space High Power Electric Propulsion System of more than 20kW.

Our project is dedicated to advancing the development of a durable 20kW Hall-Effect Thruster System, targeting a Technology Readiness Level (TRL) of up to 6. This initiative is focused on enhancing the Electric Propulsion System, as a strategic action to enable European capabilities for exploration, interplanetary transportation and servicing applications.

Considering the technology maturity, operation flexibility and thrust-to-power ratio requirements of the exploration/transportation concepts, high-power 20kW-class power Hall thrusters represent ideal solutions.

Welcome onboard!

ASPIRE'S Activities

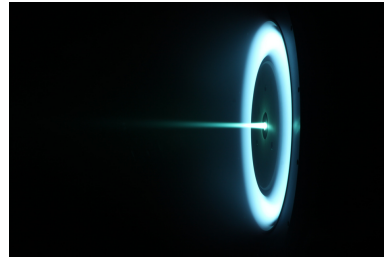
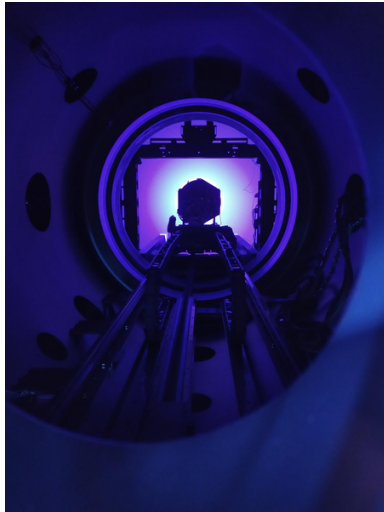
- The ASPIRE project is focused on solidifying the requirements and design of the Electric Propulsion System (EPS), enhancing the design, and understanding the behavior of EPS in combined configurations.
- It is also developing analytical and simulation tools for predicting long-term system performance.
- The project works on characterizing an Electric Propulsion System (EPS) under various background pressures and with alternative propellants.
- And finally, ASPIRE is dedicated to establishing a clear roadmap for the In Orbit Validation of the EPS

Interesting Project insights

ASPIRE is a groundbreaking project utilising cutting-edge technology to push the boundaries of high-power electric propulsion systems(EPS) for spacecraft.

The system's performance translated into a power gain of over 3kW at BOL, coupled with a considerable mass saving of more than 160kg, thereby allowing for additional payloads.

The system's efficiency reached a notable 98% within the DDU architecture, marking a significant improvement over the 83.8% efficiency found in traditional PPU configurations.



The thruster unit is SITAEL's HT20kW EM+, a 20kW-class magnetically shielded Hall thruster coupled with the centrally mounted SITAEL HC60 EM cathode.

ASPIRE is implementing an Alternative Qualification Strategy (AQS) innovative framework aiming to achieve substantial reduction in cost and time to qualify the propulsion system to enter the market.

News and Activities

Throughout its life, ASPIRE has engaged in a variety of activities, including significant participation in conferences and workshops, contributing to the field of electric propulsion systems. To access the project papers and research contributions please visit project's "Documentation" section.

Some of the recent announcements and broader activities:

Final Dissemination Event
17th April 2024, Pisa (Italy)
3-7 pm CEST, Hybrid Format

ASPIRE

JOIN US

Mark your calendars for the grand finale of the ASPIRE project, taking place in April 17th, 2024 at 3–7pm CEST in Pisa, Italy (Hybrid format: Attendees can join either in-person or online).

This eagerly anticipated Final Dissemination Event will showcase all the groundbreaking results achieved throughout the project's lifespan. For detailed information on agenda and registration process, please visit our website [here](#).

Fluid-kinetic models for space plasma thrusters

by
Jesús Perales Díaz

A dissertation submitted by in partial fulfillment of the requirements for the degree of Doctor of Philosophy in

Ingeniería Aeroespacial

Universidad Carlos III de Madrid

Advisors:
Eduardo Ahedo Galilea
Adrián Domínguez Vázquez

Tutors:
Eduardo Ahedo Galilea

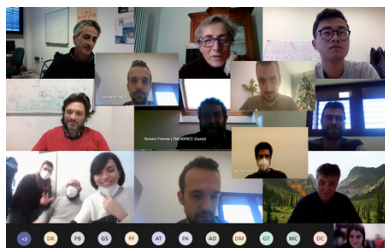
February 28, 2024

PhD thesis to be defended next month: "Fluid-kinetic models for space plasma thrusters" by Jesus Perales Diaz, with its concluding section devoted to ASPIRE activities.

Universidad Carlos III de Madrid Advisors: *Eduardo Ahedo Galilea, Adrian Dominguez Vazquez.*



Master of Science in Space Engineering with honors thesis "Computational Modeling of Hall Thruster Plasma Plumes" on May 2023 developing a model to simulate plasma thruster plumes, specifically characterizing the SITAEL 20 kW Hall thruster, HT20k. Andrea Di Sarli acknowledges the guidance of Professors Tommaso Andreussi and Fabrizio Paganucci and the support from SITAEL's Electric Propulsion Division, highlighting a promising future in electric propulsion.





From left to right: (1) Part of ASPIRE's consortium, (2) EPIC Workshop 2023 (Naples)
(3) SITAEEL presenting ASPIRE EPIC Workshop 2022, (4) Branded bags with ASPIRE logo EPIC Workshop 2023

2024 Space Propulsion Calendar

Below there is a list of key conferences in 2024 focusing on the topic of Electric Propulsion Systems:

Space Propulsion Conference 2024

Happening from May 20 to May 23 in Glasgow, Scotland, this event is organized by the Association Aéronautique et Astronautique de France along with agencies such as ESA, CNES, and UK SA. It's a gathering for discussing technical and programmatic aspects of space propulsion technologies. [Link](#).

International Electric Propulsion Conference (IEPC) 2024

This conference will be held from June 23 to June 28 in Toulouse, France, and focuses on the latest advancements in electric propulsion. The IEPC is known for bringing together experts from around the world to discuss the future of electric propulsion. [Link](#)

International Astronautical Congress (IAC) 2024

Although broader in scope, the IAC (taking place from October 14 to October 18 in Milan, Italy) features significant content on space propulsion among its wide range of topics related to the space industry. It's one of the largest gatherings in the space sector, attracting thousands of professionals. [Link](#).

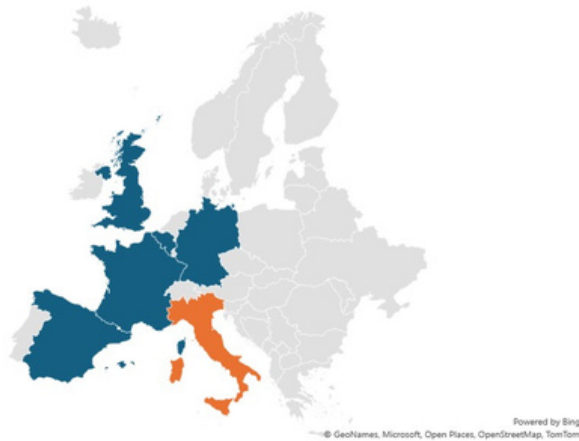
SpaceOps 2024 Workshop

Hosted by CNES in Toulouse, France, from June 18-20, 2024. This workshop will explore new subjects and paradigms in space systems operations, including discussions on new operations paradigms, solutions for operations, challenges for exploration, a zero-debris approach, and the operations of in-orbit services missions. [Link](#).

Meet our Team

The ASPIRE project is a collaborative effort involving a mix of 8 industrial and academic partners across 6 European countries, each bringing specialized skills and experience in propulsion systems, microelectronics, and space technologies. The partnership includes leading organizations in propulsion systems, and prestigious academics, all working together to push the boundaries of space exploration and technology. To learn more, visit our '[Partners section](#)' on our website.

Let us meet the team closely!



SITAEL

SITAE S.p.A. is a worldwide leading Transportation and Aerospace Group composed of synergic high-tech companies specialising in designing and producing small satellites, electric propulsion technologies, and cost-effective launchers for Low Earth Orbit missions.

Thales Alenia Space, a joint venture (JV) between Thales (67%) and Leonardo (33%), is a key European player in space telecommunications, navigation, Earth observation, exploration and orbital infrastructures.



AST | ADVANCED SPACE TECHNOLOGIES

AST Advanced Space Technologies was founded in 2010 and is specialized in technologies and processes for highly performant and miniaturized flow control components and units for space applications, especially for electric propulsion. In the ASPIRE project, AST has developed and provided the Flow Management System for the EPS.

Microtest is a company operating in the field of microelectronics consultancy relating to the design, testing, qualification, and industrialization of electronic circuits primarily for use in automotive applications.



**Imperial College
London**

Imperial College London is one of the top universities in the world. In the ASPIRE project, ICL has progressed in three areas: developing cost-efficient computational methods for plasma simulations, integrating machine learning for predictive modeling, and using simulations to improve the design and operation of plasma propulsion systems.

UC3M is a public university, with strong international focus, is ranked among the top 400 universities in the world. UC3M's part focuses on the interactions within Hall-effect thruster plumes, simulation of plume expansions in a vacuum, and hybrid plasma modeling of high-power thrusters.



The University of Pisa is a large, research-oriented University, covering all disciplines and ranking in the top 100 world universities in physics, math and computer science. UniPi participates with the Department of Physics and the Aerospace Engineering Division of the Department of Civil and Industrial Engineering.

SME4SPACE, the representative organisation of SMEs in Europe's space industry, is a private not-for-profit organisation, dedicated to advocate SME interests to public authorities such as the ESA, the European Union and its related agencies. S4S presently gathers cumulatively more than 800 SMEs active in space.



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