Doctoral Researcher, MSCA Doctoral Network position “Electric solar wind sail mission design”
Aalto University

Job Title	Doctoral Researcher, MSCA Doctoral Network position “Electric solar wind sail mission design”
Department	T411 Dept. Electronics and Nanoeng
Institution	Aalto University , , Finland
Date Posted	Dec. 23, 2025
Application Deadline	Open until filled
Position Start Date	Available immediately
Job Categories	Graduate Student Research Scientist/Associate
Academic Field(s)	Electrical and/or Electronics Energy Technology
Job Website	https://aalto.wd3.myworkdayjobs.com/aalto/job/Otaniemi-Espoo-Finland/Doctoral-Researcher--MSCA-Doctoral-Network-position--Electric-solar-wind-sail-mission-design-_R45202-1
Apply By Email	

Job Description

MSCA Doctoral Network position “Electric solar wind sail mission design”

We are now looking for two (2) Doctoral Researchers.

This PhD topic is part of the “Electric solar wind sail doctors” (E-Sailors) network, funded by the Marie Sk?odowska-Curie Actions (MSCA) Doctoral Network Programme. The E-Sailors network is designed to train the next generation of Electric solar wind sail (E-sail) scientists, developers and advocates. This particular Doctoral Researcher (DR) will work with in-orbit results of on-going missions, such as

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Foresail-1 p developed by Aalto University with the E-sail payload from the Finnish Meteorological Institute (FMI), as well as the DR will develop new and improved in-orbit E-sail experiments for future missions in lunar orbit and deep space. The DR will be enrolled at and hosted by Aalto University, Finland, with the main supervisor Jaan Praks, co-hosted by the FMI with the E-sail researcher Dr. Petri Toivanen.

Research field: Space technology, payload development
Supervisor: Jaan Praks
Offered by: Aalto University, School of Electrical Engineering

General description of programme and host
The Electric solar wind Sail doctors (E-Sailors) is a challenge-based Doctoral Network that aims to bring Electric solar wind sail (E-sail) from low Earth orbit (LEO) demonstration missions to the operational environment of the solar wind. It is delivered by 8 universities in cooperation with FMI, where E-sail was invented, and 4 companies.

E-sail is a highly innovative and potentially disruptive propellantless propulsion system. An operational E-sail consists of hair-thin and kilometres-long wires, or tethers, which are charged at a high voltage creating an electrostatic sheath (electric sail) which deflects solar wind particles and generates the propulsive effect in interplanetary environment. Successful and rapid development and deployment of the technology will ensure EU's leadership in the exploration and exploitation of deep space, the next commercial space frontier.

The programme is designed to achieve the following training objectives for our doctoral researchers:

* Equip them with core scientific skills and specialised knowledge in designing experiments for demonstrating space technologies and developing space missions;
* Provide them with a wide range of transferrable skills, such as Open Science and FAIR, communicating science to public, advocacy, networking etc.;
* Develop their business and entrepreneurship skills, such as IPR management, preliminary business planning, pitching to investors, starting start-ups.

Aalto University is a leading Finnish university combining science, technology, design, and business to foster innovation and multidisciplinary research. The Aalto Space Lab is a comprehensive facility dedicated to the development, integration, and qualification of small satellites and space payloads. The laboratory features an advanced electronics development environment equipped for precision soldering, calibration, functional testing, and sensor characterization. A dedicated cleanroom area supports the assembly and integration of flight hardware, ensuring high reliability and adherence to

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space standards.

Adjacent to the electronics lab, the Space Technology Testing Laboratory provides an advanced thermal-vacuum facility that enables environmental testing of complete satellites and subsystems under simulated space conditions. This includes vacuum, thermal cycling, thermal balance, and outgassing testing, essential for qualifying hardware for launch and orbital operation.

The Space Lab also offers access to a wide suite of engineering and simulation software for electronics design, spacecraft systems modelling, structural and thermal analysis, and mission performance verification. Together, these resources support the full development cycle—from early concept design and prototyping to environmental qualification and flight readiness.

The Aalto Space Lab serves as a key hub for small satellite and payload research, education, and technology demonstration, supporting academic projects, collaborative research initiatives, and industrial partnerships that advance Finland’s growing role in space technology.

Description of specific PhD project
Please indicate in your cover letter which of the two positions you are primarily interested in.

Position 1: The E-Sailor 8
The E-Sailor 8 doctoral position focuses on developing advanced methods for E-sail tether deployment monitoring and safety, combining simulation, laboratory testing, and in-orbit validation. The candidate will create dynamical and photorealistic 3D models of the tether and spacecraft to support both engineering analysis and visual monitoring during deployment, working in coordination with the RT3D development led by E-Sailor 15. The research includes conducting laboratory and in-orbit experiments using data from the Foresail-1p mission, analysing tether dynamics, imaging, and operational behaviour. Based on these results, the doctoral researcher will propose and evaluate new deployment schemes and safety strategies, contributing to the reliability of future E-sail missions. The work will result in models and validated methods shared with the wider community to support ongoing and upcoming E-sail technology developments.

Duration of the work contract and place of employment: The position is based at Aalto University (24 months) with collaboration at CrystalSpace (CS) (12 months), under the supervision of Jaan Praks (Aalto) and Jaan Viru (CS).

Position 2: The E-Sailor 4
The E-Sailor 4 doctoral position focuses on the design and engineering of an electric sail (E-sail) payload system for nanospacecraft, with a particular emphasis on developing the payload for the

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ESTCube-LuNa mission. Building on previous demonstrations such as ESTCube-1, ESTCube-2, and Foresail-1p, the project aims to apply lessons learned to create a more capable and reliable E-sail payload. The work involves analysing previous mission data, defining requirements for new payloads, and designing the mechanical, electrical, and deployment subsystems for ESTCube-LuNa.

E-Sailor 4 will also lead the development and testing of a prototype payload, performing functional and environmental tests to verify its performance and requirements for spacecraft integration. The research will result in three main publications covering lessons learned, design development, and prototype testing. In the final project phase, the doctoral researcher will spend 6 months at Spacecraft Anatomy (SA) to gain industrial experience in space hardware manufacturing and qualification. The project will deliver a E-sail payload prototype design and strengthen the technological foundation for future nanospacecraft missions using E-sail propulsion.

Duration of the work contract and place of employment: The main supervisor of the DR at Aalto University, Finland (15 months) is Assoc. Prof. Jaan Praks. The DR will also be co-supervised by the E-sail inventor Petri Toivanen while working for 15 months at the FMI, Finland and by Dr. Iaroslav Iakubivskyi while working 6 months at Spacecraft Anatomy, Estonia.

Additional details of the positions
Starting date: The position is expected to start in the first half of 2026.
Trial period: 6 months
Target degree: Doctoral degree from Aalto University, Finland
Approximate gross salary: The salary for a Doctoral Researcher at Aalto University is 3075 EUR per month, which will be adjusted according to the eligible allowances based on MSCA funding. The family allowance will be clarified with the selected candidate once their situation is defined. The salary at FMI is 2900-3200 EUR/month at the beginning of employment. The starting salary at Spacecraft Anatomy is approx. 2700 EUR/month, plus family allowance, if applicable.

Requirements for PhD Position

* Master's degree in Aerospace Engineering, Space Technology, Physics, Mechanical Engineering, Computer Science, or closely related field.
* Excellent command of written and spoken English.
* Research experience and independent work experience evident through technical projects, theses, publications, or technical reports. This includes the evidence of innovative thinking or novel approaches to technical problems, the ability to synthesize information from multiple sources to advance understanding and demonstrated curiosity and persistence in pursuing technical challenges.
* Strong academic and development track record with demonstrated proficiency in orbital mechanics

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and propagators (GMAT, STK, or similar), propulsion systems, spacecraft dynamics, space systems, space mission and environment analyses, cubesats, small spacecraft systems, space plasma physics, software development and version control (Git), simulation software development (experience in multiple fields are considered beneficial).
* Familiarity with simulation software and numerical methods and proficiency in programming languages (Rust, Python, MATLAB, C/C++, or similar) for simulation and data analysis.
* Experience in managing multiple concurrent tasks and priorities independently and track record of meeting project deadlines and delivering results without constant supervision.
* Proven ability to work autonomously on complex technical problems and demonstrated problem-solving skills in technical/engineering contexts.
* Leadership experience in terms of leading or significantly contributing to multi-month technical projects and taking initiative in research or development activities.
* Experience working with interdisciplinary and international teams while maintaining individual accountability, such as driving projects forward without extensive guidance.
* Example of at least one practical project completed within the deadline with minimal supervision, and evidence of self-motivation and proactive problem-solving. Please submit description of personal contributions and level of independence, project outcomes and impact, and references in terms of publications, theses, technical reports, simulations, analysis, code samples, or documentation (multiple references are considered beneficial).
* The above duties are not exhaustive; the PhD candidate may be required to undertake other tasks consistent with the role and the objectives of the E-Sailors Doctoral Network.

Duties and Responsibilities
Position 1: The E-Sailor 8

* Undertake innovative and independent research on E-sail tether deployment monitoring, dynamics, and safety to enhance the reliability of future nanosatellite missions.
* Carry out literature reviews, requirement analyses, and theoretical studies on tether mechanics, deployment systems, and in-orbit monitoring approaches.
* Develop and validate numerical models of tether and spacecraft dynamics, and create photorealistic 3D visualizations to support monitoring and analysis of deployment behaviour.
* Adapt, develop, and learn new simulation, modelling, and imaging tools, including integration with real-time visualization frameworks such as RT3D.
* Plan and execute laboratory experiments to characterize tether deployment and verify model performance under controlled conditions.
* Contribute to in-orbit testing and data analysis activities related to the Foresail-1p mission, including image-based monitoring and interpretation of tether behaviour.
* Design and propose improved E-sail tether deployment schemes, safety mechanisms, and

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operational procedures for future missions.
* Document and communicate research progress through high-quality technical reports, scientific publications, and conference presentations.
* Collaborate closely with academic and industrial partners at Aalto University and CrystalSpace, while maintaining the ability to work independently and solve technical challenges proactively.
* Stay up to date with advances in spacecraft dynamics, tether technologies, and on-board imaging systems, integrating new insights into the research.
* Actively contribute to outreach and communication activities that promote awareness of E-sail technology and space engineering research.
* The above duties are not exhaustive; the PhD candidate may be required to undertake additional tasks consistent with the role and the objectives of the E-Sailors Doctoral Network.

Position 2: The E-Sailor 4

* Undertake innovative and independent research on the design, development, and testing of nanosatellite-compatible E-sail payload systems, contributing to the advancement of sustainable electric sail propulsion technology.
* Carry out literature reviews, requirements analysis, and conceptual studies based on lessons learned from previous E-sail missions (ESTCube-1, ESTCube-2, Foresail-1p) to define the design framework for next-generation E-sail payloads.
* Develop and implement detailed design concepts for the ESTCube-LuNa E-sail payload, including mechanical layout, tether deployment mechanisms, electronics, and spacecraft interface design.
* Adapt, develop, and learn new engineering and simulation tools, software, and laboratory methodologies relevant to nanosatellite payload design, integration, and testing.
* Lead the manufacturing and experimental validation of the ESTCube-LuNa E-sail payload prototype, including functional testing, thermal-vacuum testing, and environmental qualification.
* Document and communicate research results in professional written English through technical reports, design documentation, and peer-reviewed scientific publications.
* Present research progress and findings at academic and industry conferences, workshops, and project meetings, addressing both technical and non-technical audiences.
* Collaborate closely with researchers and engineers at Aalto University, FMI, and Space Application (SA), while maintaining the ability to work independently and proactively address technical challenges.
* Stay current with developments in spacecraft propulsion, nanosatellite engineering, and plasma interaction technologies, integrating new findings into project activities.
* Contribute actively to outreach, education, and public engagement activities related to space technology and E-sail research.
* The above duties are not exhaustive; the PhD candidate may be required to undertake other tasks consistent with the role and the objectives of the E-Sailors Doctoral Network.

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Eligibility requirements

* The applicant must be a doctoral candidate (i.e. not already in possession of a doctoral degree at the date of the recruitment). The researcher to be recruited can be of any nationality.
* At the time of recruitment, the researcher must not have resided or carried out their main activity (work, studies, etc.) in Finland for more than 12 months in the three years immediately prior to the recruitment date. Compulsory national service and/or short stays such as holidays are not considered.
* If you are chosen for this position, you will apply for the study right in doctoral studies at Aalto University School of Electrical Engineering. Thus, please see the student information and admission criteria at [url=https://www.aalto.fi/en/study-options/aalto-doctoral-programme-in-electrical-engineering]https://www.aalto.fi/en/study-options/aalto-doctoral-programme-in-electrical-engineering.

How to apply?
Please submit your application through our online recruitment system. To access the recruitment system, please use the "Apply now!" link below. Please apply as soon as possible, at the latest by January 31st, 2026 (at 23.59 UTC +2).

The applicant must submit the following documents through the Aalto portal; only clear copies of documents will be considered. Please note that our recruitment system allows maximum of 5 attachments, so please combine the copies of certificates and transcripts in one PDF, if necessary.

* Copies of the bachelor's and master's degree certificates including transcripts. For degrees completed in European universities, include also the Diploma Supplement. If the original documents are in a language other than English, include also translations into English. Finnish and Swedish certificates are also accepted.
* Motivation letter: maximum 1 page where you introduce yourself and present your qualifications; you may include also your previous research fields and main research results. Please emphasize your future goals career-wise
* Curriculum Vitae/CV
* List of publications (if any) showing your contribution in the publication
* References: Contact detail(s) of referee(s) included in the CV

Please remember to indicate in your application which position you are primarily interested in (Position 1: The E-Sailor 8 or Position 2: The E-Sailor 4).

Please note that we might begin conducting interviews already during the application period, so early applications are encouraged. This allows us to get to know candidates as soon as possible and keep the process moving efficiently.

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For more information about the position, please contact Associate Professor Jaan Praks, ([url=mailto:jaan.praks@aalto.fi]jaan.praks@aalto.fi). Additional information in recruitment process related questions, please contact ELEC’s HR team, [url=mailto:hr-elec@aalto.fi]hr-elec@aalto.fi.
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Contact Information

Please reference Academickeys in your cover letter when applying for or inquiring about this job announcement.

Contact

Finland