

Postdoctoral researcher in the field of superconducting
Josephson field effect transistors in silicon
Aalto University

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Job Title Postdoctoral researcher in the field of superconducting
Josephson field effect transistors in silicon
Department T304 Dept. Applied Physics
Institution Aalto University
, , Finland

Date Posted Nov. 24, 2025

Application Deadline Open until filled
Position Start Date Available immediately

Job Categories Post-Doc

Academic Field(s) Physics - General

Job Website https://aalto.wd3.myworkdayjobs.com/aalto/job/Otaniemi-Espoo-Finland/Postdoctoral-researcher-in-the-field-of-superconducting-Josephson-field-effect-transistors-in-silicon_R44833

Apply By Email

Job Description

Aalto University is where science and art meet technology and business. We shape a sustainable future by making research breakthroughs in and across our disciplines, sparking the game changers of tomorrow and creating novel solutions to major global challenges. Our community is made up of 13 000 students, 400 professors and close to 4 500 other faculty and staff working on our dynamic campus in Espoo, Greater Helsinki, Finland. Diversity is part of who we are, and we actively work to ensure our community's diversity and inclusiveness. This is why we warmly encourage qualified candidates from all backgrounds to join our community.

At the Department of Applied Physics, our pioneering research in physical sciences creates important industrial applications that hold great technological potential. Our research focuses on Materials

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physics, Quantum technology, Soft & living matter, and Advanced energy solutions. Topics extend from fundamental research to important applications. We educate future generations of research and development professionals, data specialists, technology experts, inventors, and scientists for industry and society.

NANO group at the Department of Applied Physics, is seeking outstanding candidates for the position of

Postdoctoral Researcher

We are looking for talented condensed matter experimentalists to work on Josephson field effect transistors (JoFETs) in silicon at Aalto University School of Science. In this position you will have a chance to make an impact on the foundations of modern superconducting technology in reduced dimensions as well as to prepare new devices and methods of quantum information processing.

Our goal is to achieve JoFETs by utilizing hybrid devices based on silicon and high-quality superconducting silicides. Remarkably, silicides hold promise for realization of coherent superconducting quantum circuits, enabling scalability with minimal additional cost and reduced complexity in technology transfer. Successful realization of these components requires careful band engineering, in particular minimization of the Schottky barrier and the enhancement of interface transparency at the silicide/Si interface. By applying an electric field through a set of gates, the charge carrier density in a thin, doped Si region can be controlled, enabling the fabrication of gate-tunable silicide/Si/silicide junctions. Moreover, various techniques from CMOS technology can be employed for optimization of the transparency of the Schottky barrier and for promoting performance of Josephson field-effect transistors (JoFETs). With sufficient coherence, these JoFETs components will provide a scalable building block for gate-monitored qubits and other quantum circuits. In parallel, we will conduct various experiments on the silicide films to investigate the possible emergence of triplet superconducting correlations. Applications of triplet superconductors in quantum devices (e.g. in Kitaev chains) would be a significant step beyond the state-of-the-art in quantum technology.

Your role and goals

You will be developing technologies for hybrid silicon devices with tunable supercurrent, designing new superconducting circuits, supervising graduate students, taking part in the fabrication of the devices, implementing and carrying out measurements over a broad range of temperatures, participating in international collaborative work in silicide superconductivity, as well as interacting with theorists to understand what kind of information can be extracted from the measurements.

The work is done as teamwork in the NANO research group at Aalto University School of Science, in collaboration with the groups in the National Center of Excellence QTF - Quantum Technology Finland,

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in particular with the PICO group. International collaborators include groups from Taiwan (National Yang Ming Chiao Tung University), Denmark (Niels Bohr Institute), France (CEA, Grenoble), and the USA (University of Washington).

Your experience and ambitions

We are looking for highly motivated postdoctoral researchers to work on induced superconductivity in silicon. In an international team effort, thin superconducting silicon channels will be turned into superconducting field effect transistors that form novel building blocks for example for gatemon qubits. The work is at the leading edge of quantum materials science, which calls for talented people with understanding of theoretical issues in proximity-induced superconducting materials and eagerness to work on tough experimental challenges at low temperatures. We expect the candidates to have:

- * PhD degree in physics or in a nearby field
- * Experience on silicon materials, 2D electron gases and semiconducting devices
- * Good understanding of superconductivity and energy bands in materials
- * Mastering of micro and nanofabrication techniques
- * Automation of experiments with MATLAB, Python, or equivalent
- * Experience on operating cryogenic equipment below 4 K
- * Working knowledge of AC/microwave measurement techniques
- * Excellent skills in English. Finnish language is not required.

What we offer

A vigorous research environment of quantum technology in one of the largest innovation hubs of Nordic countries. Our research group NANO is a member of the Academy of Finland's Center of Excellence "QTF- Quantum Technology Finland", national flagship project "Finnish Quantum Flagship", and a wider, multidisciplinary collaboration "Institute Q". The work takes place using state-of-the-art measurement and nanofabrication facilities at Low Temperature Laboratory and Micronova nanofabrication center, which are part of the national OtaNano research infrastructure (<http://www.aalto.fi/en/otanano>).

In this position, you have the possibility to follow closely the development of quantum technology and modern superconducting device engineering. You will gain experience on high-frequency operation and measurement of superconducting quantum circuits, which forms the basis of the most promising present paradigm for quantum computation. Furthermore, the collaboration within InstituteQ opens up avenues for applications of your knowhow and newly developed technologies.

The fixed term contract is initially for two years. The annual workload of research and teaching staff at Aalto University is currently 1612 hours. Aalto University follows the salary system of Finnish

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universities. The starting salary for a Postdoctoral researcher is approx. 4130 €/month. The salary ranges from 4130 € to 4540 € per month, depending on previous experience. The contract includes occupational healthcare. The primary workplace will be the Otaniemi Campus at Aalto University.

Ready to apply?

To apply for the position, please submit your application including the attachments mentioned below as one single PDF document in English through our online recruitment system by using the link on Aalto University's web page ("Apply Now").

- (1) Letter of motivation
- (2) CV including list of publications
- (3) Degree certificates and academic transcripts
- (4) Contact details of at least two referees (or letters of recommendation, if already available)

The deadline for applications is December 21, 2025, while the screening of candidates will start immediately. The position will be filled as soon as a suitable candidate is identified. For additional information, kindly contact Prof. Pertti Hakonen ([pertti.hakonen \(at\) aalto.fi](mailto:pertti.hakonen@aalto.fi)).

Aalto University reserves the right for justified reasons to leave the position open, to extend the application period, reopen the application process, and to consider candidates who have not submitted applications during the application period.

Please note: Aalto University's employees should apply for the position via our internal HR system Workday (Internal Jobs) by using their existing Workday user account (not via the external webpage for open positions).

Want to know more about us and your future colleagues? You can watch these videos:

[url=<https://www.youtube.com/watch?v=i8zawpNMVG8>]This is Aalto University!

[url=https://www.youtube.com/watch?v=5k_og_6zUJQ]Aalto University - Towards a better world and [url=https://www.youtube.com/watch?v=ZK6pDWm1_CE]Shaping a Sustainable Future.

Read more about working at Aalto: [url=<https://www.aalto.fi/en/careers-at-aalto>]Careers at Aalto | Aalto University

Check out our new virtual campus experience: [url=<https://virtualtour.aalto.fi/>]Aalto University - virtual campus tour

About Finland

Finland is a great place for living with or without family - it is a safe, politically stable and well-organized Nordic society. Finland is consistently ranked high in quality of life and was listed again as the happiest

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More about Aalto University:

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Contact

Finland