Doctoral Researcher in Experimental Ultracold Quantum Gases
Aalto University

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Posted Aug. 1, 2025, set to expire Dec. 31, 2025

Job Title	Doctoral Researcher in Experimental Ultracold Quantum Gases
Department	T304 Dept. Applied Physics
Institution	Aalto University , , Finland
Date Posted	Aug. 1, 2025
Application Deadline	Open until filled
Position Start Date	Available immediately
Job Categories	Graduate Student
Academic Field(s)	Physics - General
Job Website	https://aalto.wd3.myworkdayjobs.com/aalto/job/Otaniemi-Espoo-Finland/Doctoral-Researcher-in-Experimental-Ultracold-Quantum-Gases_R43780-1
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 120 nationalities, 14 000 students, 400 professors and close to 5000 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 physics, Quantum technology, Soft & living matter, and Advanced energy solutions. Topics extend

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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.

We are now looking for a

Doctoral Researcher in Experimental Ultracold Quantum Gases

Position overview:

The successful candidate will join the Research Council of Finland funded project [url=https://research.fi/en/results/funding/83051]Building Blocks of Turbulence. This ambitious project aims to deepen our understanding of turbulence, a complex and fundamental phenomenon in fluid dynamics that affects various fields, from engineering to atmospheric sciences. The project aims to study the foundations of turbulent processes at the smallest scales by controlling individual quantum vortices in a Bose-Einstein condensate (BEC).

Project background:

Turbulence remains an unsolved complex non-linear problem in the field of physics. Utilizing a BEC simplifies the problem since any flow pattern is a sum of contributions from identical microscopic whorls, [url=https://doi.org/10.1038/s41586-021-04047-4]quantum vortices. At length scales larger than the inter-vortex distance, turbulent dynamics is driven either by [url=https://doi.org/10.1073/pnas.2018406118]vortex-vortex reconnections, or by [url=https://www.nature.com/articles/s41567-023-01966-z]wave-like excitations on vortices which also carry the energy at the smallest scales. In this project, we will focus on exploring the latter by pioneering three-dimensional control of flow fields in the programmable potential.

Your role and goals * Design and build the first ultracold quantum gas apparatus in Finland, based on a BEC of 87Rb * Utilize modern light-shaping technology to trap the BEC in a programmable three-dimensional uniform box trap * Control the trapping potential to create and control individual quantum vortices, and develop novel methods to drive wave-like excitations * Collaborate with leading international experimentalists, theorists, and computational scientists * Present scientific results in international conferences and prepare research manuscripts for submission in top-tier scientific journals

The successful candidate is expected to participate in all aspets of the experimental effort in designing and building the experimental apparatus, and to have an open mindset due to the vast quantity of design aspects involved. In return, they will obtain excellent training in the inner workings of a modern

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quantum gas experiment, learn how to prepare scientific presentations and top-tier manuscripts, and gain invaluable experience in setting up a complex experiment from scratch.

Your experience and ambitions * A Master’s degree (or equivalent) in physics: photonics, AMO physics, quantum optics, or a related discipline * Excellent communication skills (fluency in English) and strong collaboration abilities * Finnish language is not required * Strong interest and motivation to conduct high-impact research in quantum science utilizing a wide range of experimental techniques * Prior experience in laser systems, device automation, CAD design, programming, vacuum systems, machine learning and/or electronics is considered advantageous but not required * Alignment with [url=https://www.aalto.fi/en/our-strategy/our-purpose-values-and-way-of-working]our core values

What we offer * Full-time, 4-year PhD funding through the Research Council of Finland. The fixed term contract is initially for 2 years with a possible 2-year extension after passing the midterm review. * Meaningful and inspiring environment. We are proud of our purpose to shape a sustainable future. We spark the game changers of tomorrow, and renew society with research-based knowledge, creativity and an entrepreneurial mindset. * Culture that inspires and includes everyone. All our work is guided by the values of the university: responsibility, courage, and collaboration. It’s the people that create Aalto, now and in the future. We want to be an open community where equality and inclusion enable curiosity, innovation, collaboration and wellbeing. * Support, coaching and sparring when you feel you need it. * Great possibilities for competence development and learning. We constantly keep learning to find the most impactful ways to empower - and invest in - our people.

Our vast array of professional development opportunities means you will grow and learn, having the chance to participate actively in staff trainings and development projects based on your interests and needs.

The salary range for this position is approximately 2815-3337 €/month (gross) and includes occupational healthcare and research travel opportunities.

We value work-life balance and well-being in all aspects of life. We work in a hybrid model, with the primary workplace located at the Otaniemi Campus in Espoo, Finland. Life on the revitalized campus is vibrant, featuring stunning architecture, tranquil nature, and a variety of cafes, restaurants, and services, all complemented by excellent public transportation connections.

Join us!

To apply, please share your CV and motivation letter with us through our recruitment site (click the "Apply” button) latest at 23.59pm (EET) 31st August 2025. Please provide:

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(1) Motivation letter (1 page)
(2) CV
(3) Copies of academic transcripts and degree certificates
(4) Contact details of at least one academic referee

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). If you are a student or visitor at Aalto University, please apply with your personal email address (not aalto.fi) via [url=https://www.aalto.fi/en/careers-at-aalto]Aalto University open positions

For more information about the role, please contact Academy Research Fellow Dr. Jere Mäkinen, jere.makinen@aalto.fi

We will go through applications, and we may invite suitable candidates to interview already during the application period. The positions will be filled as soon as suitable candidates are identified. We aim to have a transparent and equal recruitment process, so feel free to ask us for feedback.

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]https://www.aalto.fi/en/careers-at-aalto

Check out our new virtual campus experience: [url=https://virtualtour.aalto.fi/]https://virtualtour.aalto.fi

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 country in the world: [url=https://worldhappiness.report/news/world-happiness-report-2025-people-are-much-kinder-than-we-expect-research-shows/]World Happiness Report 2025
For more information about living in Finland: [url=https://www.aalto.fi/en/careers-at-aalto/for-international-staff]Aalto Careers for International Staff.

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Contact Information

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

Contact

Finland