

**QUANTUM  
EXPERI-  
MENT &  
THEORY  
UNDER ONE  
ROOF**

# Hello Sandoko Kosen



## Dr Sandoko Kosen

Researcher at the Department of Microtechnology and Nanoscience, Quantum Technology Laboratory at Chalmers

### Why did you choose to work at WACQT and Chalmers?

I started thinking about my post-graduation plan around the time when I was about to finish writing up my PhD thesis. I thought quantum computing was cool, so I applied to several research groups in Europe focusing on this area. I found out about the WACQT and Chalmers activity from Dr Giovanna Tancredi who was already a researcher at Chalmers.

My visit to WACQT and Chalmers was very interesting and enjoyable. The opportunity to work on scaling up the superconducting quantum processor using 3D integration technology sounded exciting, and while I knew little about it, I thought I could contribute to the ambitious goal and also have the rare opportunity to help shape the path towards it, so I accepted the Chalmers offer and moved to Gothenburg.

It turned out that I was right. There is a good balance between science and engineering in our work, we get the opportunity to publish our works, and have our contributions acknowledged and appreciated by the community. I certainly feel that we are making real progress towards achieving our goals and advancing the state-of-the-art of high-quality superconducting quantum processors.

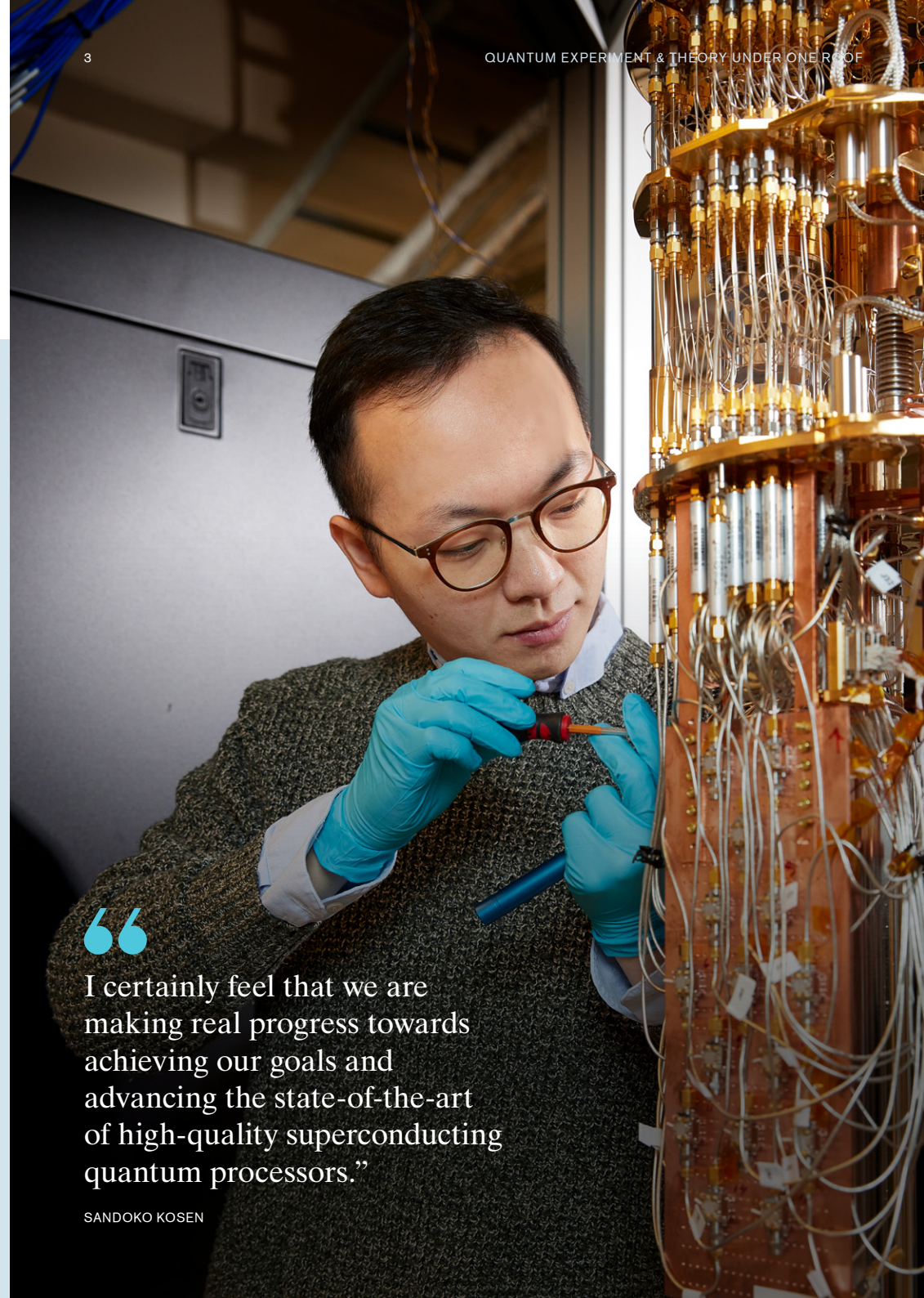
### What was it like to move to Sweden?

I was a bit anxious about moving to Sweden which is quite unlike other countries I have lived. I am glad though, Sweden lived up to most of its good reputations. Everything including the tax reporting system is very well-integrated, I really like it. I have been fortunate for having found great friendships with the people in WACQT as well as in non-work-related communities. Gothenburg has a very nice vibe and is, so far, very welcoming to international people. The summertime is absolutely beautiful in Sweden, I really recommend it.

Administrative-wise, it was almost hassle-free in my case after I accepted the offer. Our administrator and HR staff are very experienced and made sure I could settle down properly. Couldn't have asked for a better onboarding experience!

### Describe what you do on a "regular workday"!

It really depends on the focus at that point in time and if there are urgent matters in the lab and the cleanroom that I have to attend to. When things are "normal", I would usually start my day by checking messages, emails, and new, relevant papers at the arXiv repository. After that, I shift gears into a sprint mode, trying to achieve the one or two critical tasks



I certainly feel that we are making real progress towards achieving our goals and advancing the state-of-the-art of high-quality superconducting quantum processors.”

SANDOKO KOSEN

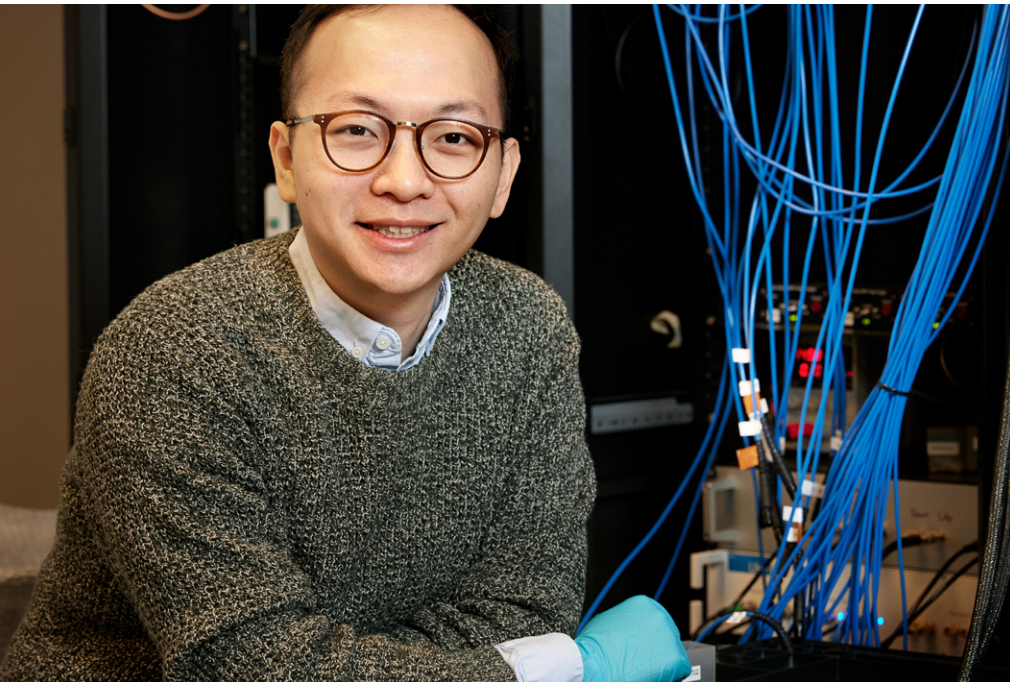
that I have planned for myself. We have our usual lunch at noon, I usually grab a sandwich from a local cafe, and head to our common kitchen area to join others. My afternoon varies from day-to-day, it could be full of meetings, sometimes interspersed with trips to the measurement lab or the cleanroom, or it can be very calm which I truly enjoy by returning to my office to continue my work until the end of day. Sometimes on Friday, we head off to a local bar at the end of the day with others for drinks and dinner.

Really the best part about working at WACQT and Chalmers is the people you get to work with. We have an interesting collection of people with various sets of skills, and it has always been a true joy to learn from them. Sometimes we argue on various matters which I think reflects how difficult it is to build a quantum computer. Bringing these different perspectives together has not always been easy, but we have managed to do it and keep delivering progress and getting us closer to our next milestones.

“

We have an interesting collection of people with various sets of skills, and it has always been a true joy to learn from them.”

SANDOKO KOSEN



## About WACQT



The world is on the brink of a quantum revolution, with extremely powerful quantum computers, eavesdrop-proof communications, and hyper-sensitive measuring instruments in sight. The Wallenberg Centre for Quantum Technology – WACQT – is a twelve-year billion-dollar investment that will take Sweden to the forefront of this very rapidly growing technology area.

An extensive research program aims to develop and secure Swedish competence in the main areas of quantum technology: quantum computation and simulation, quantum communication and quantum sensing. Our core project is to develop a 100-qubit superconducting quantum computer that can solve problems far beyond the reach of the best conventional supercomputers.

WACQT is directed from Chalmers University of Technology and also involves Lund University, KTH, Stockholm University, Linköping University and University of Gothenburg, as well as several companies: Volvo, Astra Zeneca, Ericsson, Saab, Hitachi Energy, and Jepsesen.

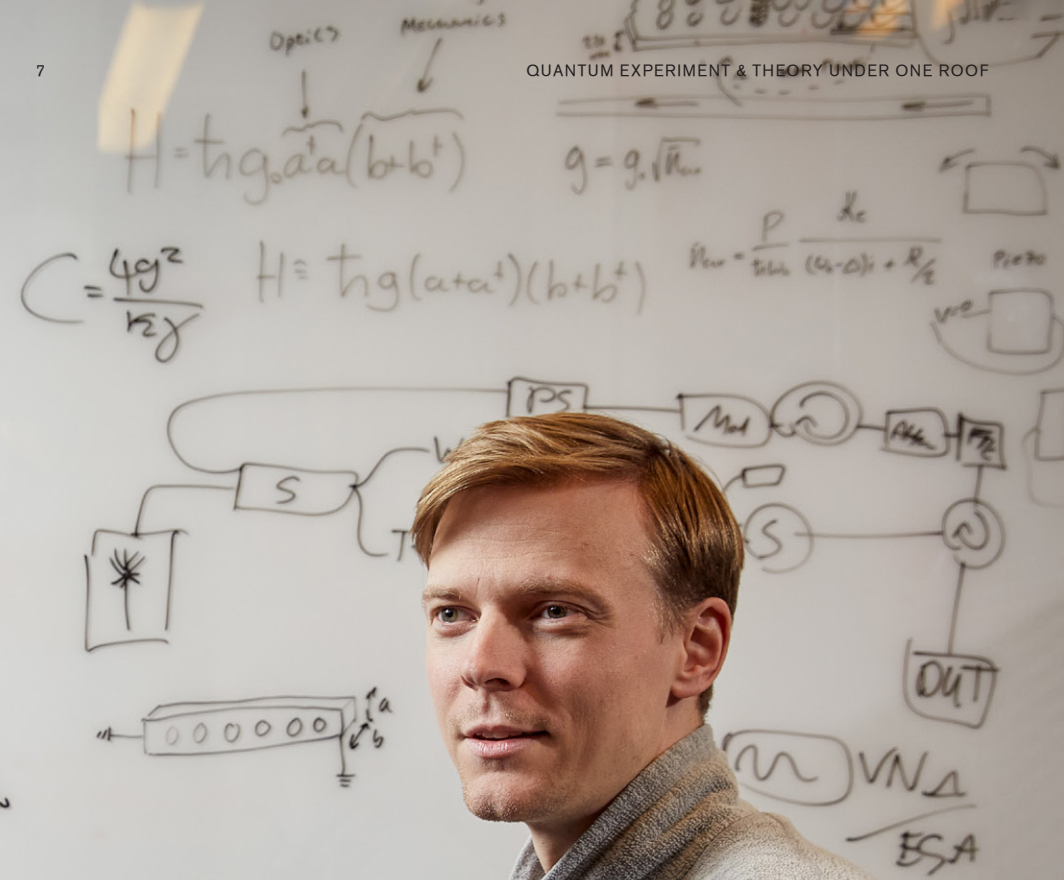
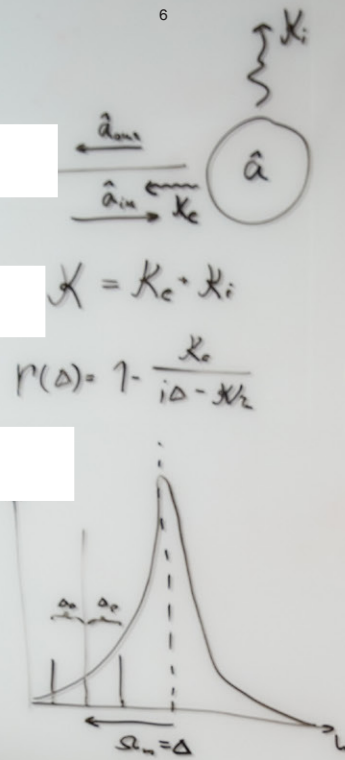
To build and stimulate an interactive and open research environment WACQT has four different but interacting activities:

- A graduate school in which academic and industrial PhD students are offered common courses in quantum technology.
- A postdoc program in which excellent young researchers can both advance their own research skills as well as contribute to spreading their knowledge.
- A guest researcher program, where experts, both from academia and industry, are invited for shorter or longer period to interact with WACQT researchers and students.
- Industrial partnerships for the exchange of ideas and knowledge between academia and industry and to secure a long-term knowledge base in quantum technology.

Principal investigators of WACQT are Per Delsing, Jonas Bylander, Giulia Ferrini, Katia Gallo, Simone Gasparinetti, Markus Hennrich, Göran Johansson, Stefan Kröll, Anne L'Huillier, and Giovanna Tancredi.

# THE

$\hat{\Psi} = \hat{H} \hat{\Psi}$



# ORY

“

An extensive research program aims to develop and secure Swedish competence in the main areas of quantum technology: quantum computation and simulation, quantum communication and quantum sensing.”

# WACQT

## An outstanding collection of Swedish universities

WACQT is directed from Chalmers University of Technology and also involves several other Swedish universities.

**Chalmers University of Technology** promotes knowledge and technical solutions for a sustainable world. Through global commitment and entrepreneurship, we foster an innovative spirit, in close collaboration with wider society.

[www.chalmers.se](http://www.chalmers.se)

Since its founding in 1827, **KTH Royal Institute of Technology** in Stockholm has grown to become one of Europe's leading technical and engineering universities, as well as a key centre of intellectual talent and innovation.

[www.kth.se](http://www.kth.se)

**Linköping University** offers innovative education and boundary-crossing research. The students are among the most desirable in the labour market and international rankings consistently place LiU as a leading global university.

[www.liu.se](http://www.liu.se)

**Lund University**, founded in 1666, offers an impressive range of high-quality research and education, made possible by our 8 400 staff members and circa 46 000 students. In recent years, Lund University has consistently ranked among the top 100 universities in the world.

[www.lu.se](http://www.lu.se)

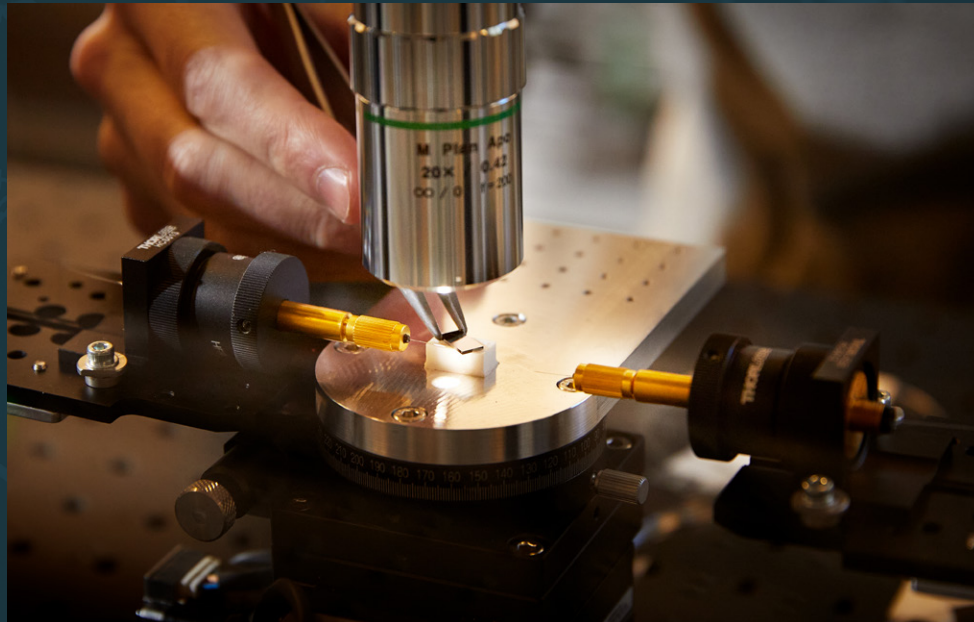
**Stockholm University** is one of Sweden's largest, with around 30,500 full-time students and 5,700 employees. We have a strong emphasis on education and research in both the human science and science, collaborating across national and international boundaries.

[www.su.se](http://www.su.se)

**The University of Gothenburg** meets societal challenges with a wide range of knowledge. Strong research and appealing study programmes attract scientists and students from around the world.

[www.gu.se](http://www.gu.se)





## Benefits of working in Sweden

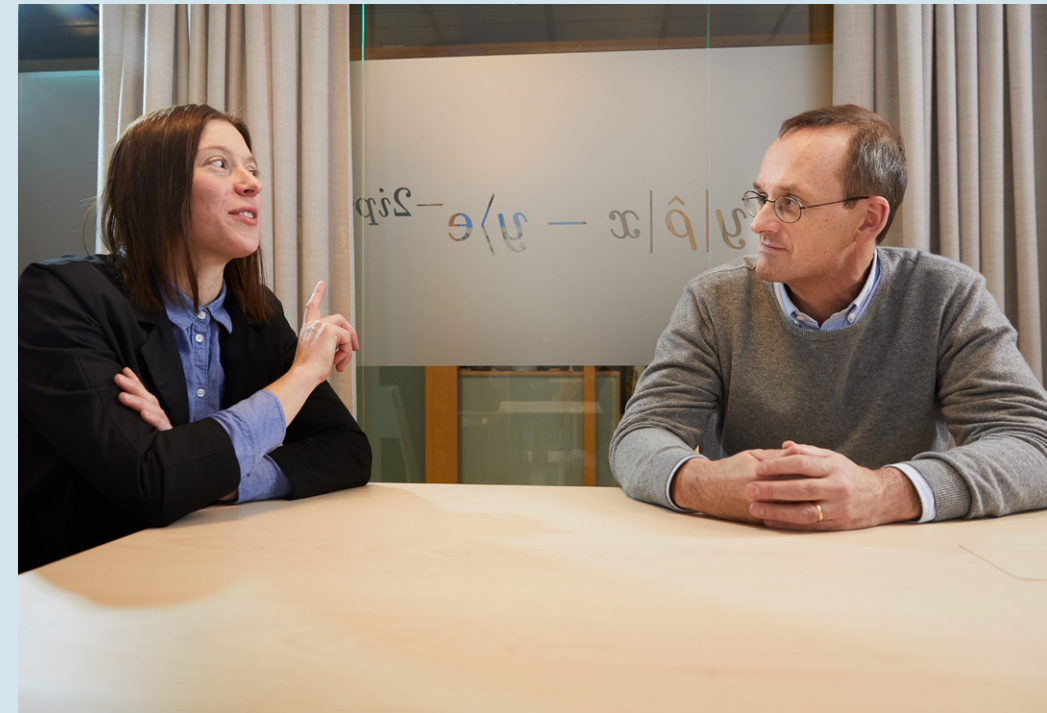
Sweden has an extensive social welfare system. The principle is that you should be able to afford being absent from work when necessary. This applies regardless of whether you are away from work because you have had a baby or because you or someone in your family gets ill. A large portion of your costs are subsidised in Sweden via tax revenue. You have paid sick leave, 480 days paid parental leave and free schooling to give a few examples. On our website you can read everything about living in Sweden and working at WACQT.

**10 M**  
inhabitants

**1st**  
Sweden is the most  
family friendly country  
in the OECD and EU  
(Unicef, 2019)

**5**  
Sweden's global  
rank in terms of  
gender equality

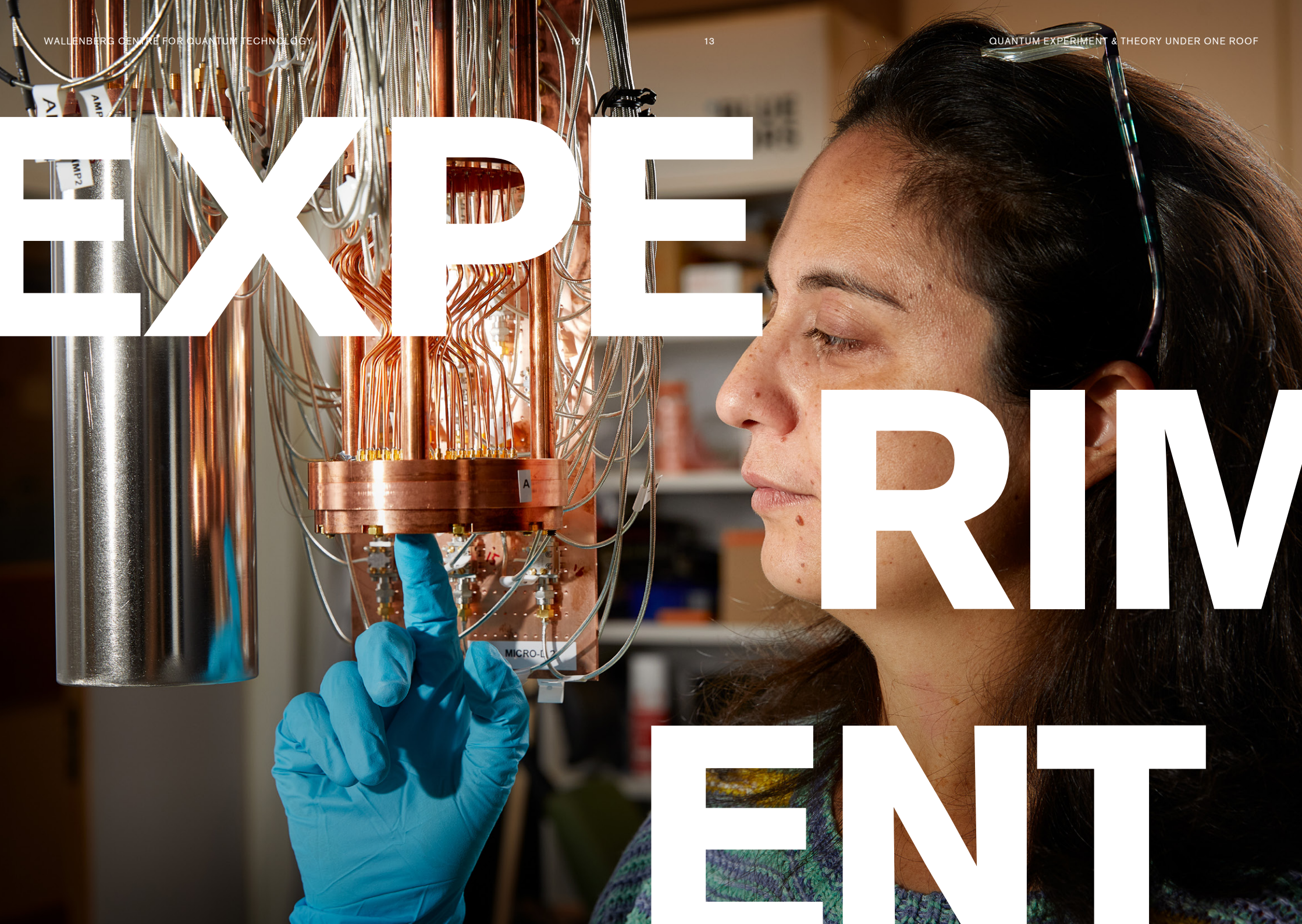
**100  
000**  
lakes



EXPE

RIM

ENT



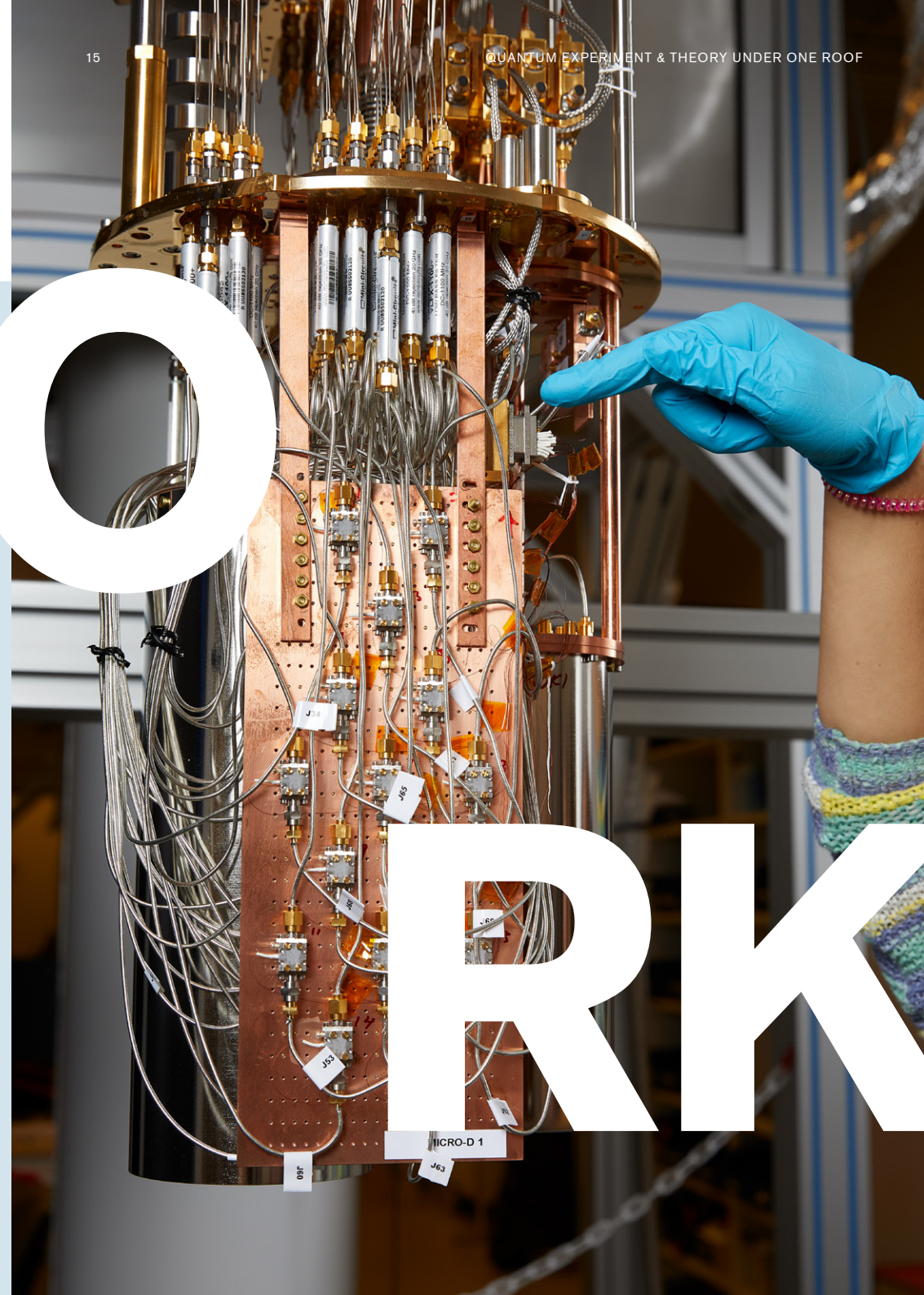
## Why work with WACQT?

- WACQT produces research results of a very high class.
- Chalmers has a world-class cleanroom, which is one of the largest and best in Europe.
- The collaboration between experiment and theory in quantum computing research is strong, a unique culture that goes back a long way. This is the only place in Europe where the entire chain from theory to experiment – the full stack – to build a quantum computer is under one roof.
- At WACQT, every individual becomes involved in the process; you are never a small cog in a large machinery. Here, the freedom to explore different tracks and ideas is more important than hierarchies. We have an environment with high ceilings, where everyone is encouraged to express their opinions and thoughts and listen to each other.
- We work for the benefit of society, and you as a researcher can make a real difference. We have a strong and well-developed collaboration with several different partners in business, rather than working for the commercial interests of a single company.
- The work at WACQT is led by highly influential people in the field.

“

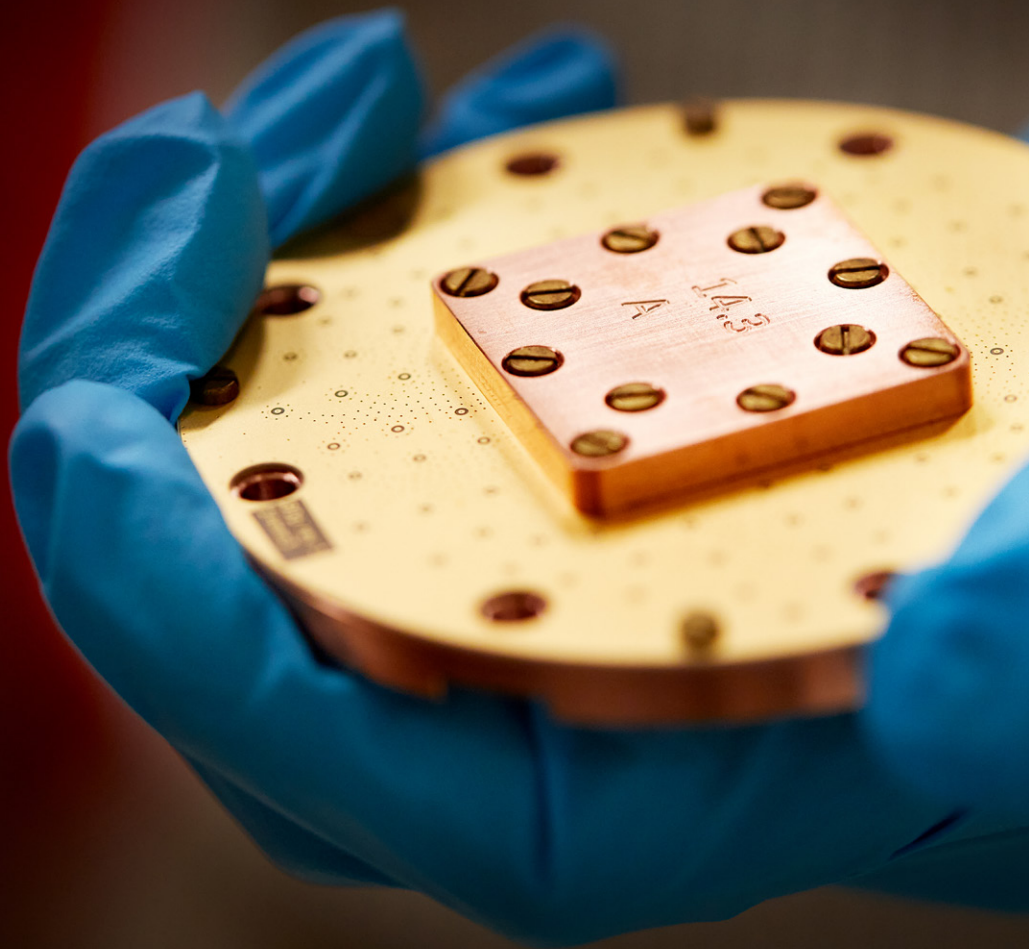
At WACQT and Chalmers, every individual becomes involved in the process, you are never a small cog in a large machinery. Here, the freedom to explore different tracks and ideas is more important than hierarchies.”

Photos  
Anna-Lena Lundqvist  
Photo page 9  
Oscar Mattsson





Contact WACQT  
Johan Veiga Benesch, scientific coordinator  
E-mail: johan.benesch@chalmers.se  
Tel: +46-31-772 32 93



**CHALMERS**

