

Curriculum Vitae

Name, position: Göran Johansson, Professor
Date of birth: 7th of December 1971
Affiliation: Department of Microtechnology and Nanoscience
Chalmers University of Technology
Phone: +46 31 772 3237
E-mail: Goran.L.Johansson@chalmers.se
Homepage: <http://mina4-49.mc2.chalmers.se/~gojo71/>

Present Position

Since 1st of December 2015

Full Professor of Theoretical and Applied Quantum Physics

Applied Quantum Physics Laboratory
Department of Microtechnology and Nanoscience
Chalmers University of Technology
Gothenburg, Sweden

Previous Position

2012-2015 Professor (not holding a chair), Chalmers University of Technology
2008-2012 Associate Professor, Chalmers University of Technology
2004-2008 Assistant Professor, Chalmers University of Technology
2002-2004 Post-doc with G. Schön, Universität Karlsruhe, Germany
2000-2002 Post-doc with G. Wendin, Chalmers University of Technology.
1999-2001 Research Project Leader,
Ericsson Mobile Data Design AB (leave of absence from 2000)

Education and degrees

Docent, November 2004, Physics,
Department of Microelectronics and Nanoscience
Chalmers University of Technology

PhD, December 1998, Physics
Department of Microelectronics and Nanoscience
Chalmers University of Technology

MSc (Civilingenjör), February 1995, Engineering Physics
Chalmers University of Technology, Gothenburg, Sweden.

Distinctions

Edlundska Priset 2016 by the Royal Swedish Academy of Sciences.

Albert Wallin Science Prize 2015 by the Royal Society of Arts and Sciences in Gothenburg.

5th place in Physics World's list of **Top Ten Breakthroughs in Physics 2011** for the report on the first observation of the dynamical Casimir effect.

Supervising experience

PhD-students

I'm currently the main supervisor of 3 PhD students and I have supervised and co-supervised 8 PhD students to their PhD graduation:

Ingrid Strandberg, started August 2017, **main supervisor**

Emely Wiegand, started March 2016, **main supervisor**

Andreas Ask, started December 2015, **main supervisor**

Sankar Raman Sathyamoorthy, **main supervisor**, PhD 2017

Joel Lindkvist, **main supervisor**, PhD 2015

Anton Frisk Kockum, **main supervisor**, PhD 2014

Martin Gustafsson, co-supervisor, PhD 2012

Lars Tornberg, **main supervisor**, PhD 2009

Robert Johansson, **main supervisor**, PhD 2009

Mirek Dobsicek, co-supervisor, PhD 2008

Andreas Käck, co-supervisor, PhD 2005

Post-docs

I've been the main supervisor of four post-docs, of whom currently one is still in my group:

Benjamin Rousseaux (2016-)

Fernando Quijandria (2015-)

Robert Jonsson (2016-2017)

Lingzhen Guo, (2014-2015)

Juha Leppäkangas, (2012-2014)

Lars Tornberg, (2012-2014)

National and international assignments of importance

Editorial work

Editor for the Springer book "Superconducting devices in quantum optics" (2016)

Guest editor of the Physica Scripta Proceedings of the Nobel Symposium on Qubits for Future Quantum Computers (2009)

Contributing editor to the KVA popular science poster for the Nobel Prize in Physics 2012.

Referee assignments

European Commission Reviewer of the FP7 STREP project SE2ND, 2012, 2013 and 2015.

Evaluator (Sakkunnig) for the recruitment of two Associate Professors in Electrical Engineering at Uppsala University (2012)

Referee for Science, Phys. Rev. X, Phys. Rev. Lett., Phys. Rev. A, Phys. Rev. B, J. of Quant. Inf. and Comp., Phys. Lett. A, Phys. E

Referee for "PALM" (Physics of Atoms, Light and Matter), University of Paris-Sud in Orsay

Referee for the National Physics Laboratory in the UK and for the Dutch funding agency Foundation for Fundamental Research on Matter.

Member of the PhD evaluation committee, 19 occasions, 9 different countries:

J. Jogenfors, Supervisor Jan-Åke Larsson, Linköping, Sweden (2017)
 J. Cohen, Supervisor Mazyar Mirrahimi, Paris, France (2017)
 T. Douce, Supervisor Pérola Milman, Paris, France (2016)
 F. Quijandria, Supervisor David Zueco, Zaragoza, Spain (2015)
 T. DuBois, Supervisor Jared Cole, RMIT University, Melbourne (2015)
 E. Dumur, Supervisors Olivier Buisson and Max Hofheinz, Grenoble, France (2015)
 A. Voje, Supervisor Andreas Isacsson, Chalmers (2015)
 E. Flurin, Supervisor Benjamin Huard, Paris (2014)
 L. Grimsmo, Supervisor Bo-Sture Skagerstam, Trondheim, Norway (2014)
 J. Pirkkalainen's PhD thesis, Supervisor Mika Sillanpää, Aalto, Helsinki (2014)
 I. Chernii, Supervisor Eugene Sukhorukov, Geneva, Switzerland (2014)
 N. Tuzla, Supervisor Eva Olsson, Chalmers (2013)
 S. Abay, Supervisor Per Delsing, Chalmers (2013)
 V. A. Mousolou, Supervisor Erik Sjöqvist, Kalmar, Sweden (2013)
 C. P. Meaney, Supervisor Gerard Milburn, University of Queensland, Australia (2011)
 L. Bishop, Supervisor Steve Girvin, Yale University (2010)
 T. Picot, Supervisor Hans Mooij, Delft, The Netherlands (2010)
 J. Leppäkangas, Supervisor Erkki Thuneberg, University of Oulu, Helsinki (2009)
 Jochen Walter, Supervisor David Haviland, Royal Institute of Technology, Stockholm (2006)

Chairman of Robin Dahlbäck's PhD thesis defense, Chalmers (2016)

Chairman of Elisa Londero's PhD thesis defense, Chalmers (2012)

Organisation of workshops and schools

I was (am) part of the organizing committee for a number of workshops and schools, e.g.

- 28th Intl. Conf. on Low Temperature Physics, LT28, Gothenburg (2017)
- Quantum Technologies, AoA Nano Initiative Seminar, Chalmers, December (2016)
- AoA Nano Community Building, Uddevalla, August (2016)
- Quantum Acoustics workshop, Mainz, May (2016)
- QUTE-EUROPE Summer School Chalmers, June (2015)
- Benasque Quantum Simulation Workshop, Spain (2015)
- Benasque Quantum Simulation Workshop, Spain (2013)
- Linneqs QuTe Summer School, Hindås, Sweden (2012)
- the Nobel Symposium on Qubits for Future Quantum Computers (2009)
- the QIPC Cluster Review Meeting at Chalmers (2009)

Commission of trust

Vice Director of the Nano Area of Advance at Chalmers (2015-)

Director of the Linnaeus Center of Engineered Quantum Systems (2009-2016)

Chairman of the Faculty at the Department of Microelectronics and Nanoscience (2008-2015)

Member of the Faculty Senate at Chalmers University of Technology (2008-2014)

Current and Recent External funding

PI on a VR project on quantum information in SAW devices, 0.8 MSEK/year, 2018-2021

PI on an VR environment on quantum plasmonics, ~4 MSEK/year, 2017-2022

PI on a KAW project on parametric devices, my share ~1 MSEK/year, 2015-2020

PI on a VR project on QI in superconducting circuits, ~1 MSEK/year, 2014-2017
 PI and “co-coordinator” in the VR Linneqs project, 800 kSEK/year, 2009-2016
 Supporting Investigator (SI) in the Nano Area of Advance at Chalmers, 125 kSEK/year
 PI on the PROMISCE EU FP7 STREP, 900k€/3 years, my share 100k€/year, 2012-2015
 Nano Area of Advance financed a PhD student (A. F. Kockum), 750 kSEK/year, 2010-2014

Quantitative Overview of Publications

Total number of publications: 84

Total number of citations: 2500+ (Web of Science, WS), 4000+ (Google Scholar, GS)

Publications in high-impact journals: **Science** (2014), **Nature** (2011), **2 Nature Physics** (2015, 2012), **19 Physical Review Letters** (11 since 2013), 1 Nano Letters and 2 Applied Physics Letters

h-index: 27 (WS), 33 (GS)

The complete list is available at <http://mina4-49.mc2.chalmers.se/~gojo71/PubList.html> with links to personal lists at

WS: <http://www.researcherid.com/rid/B-1144-2008>

GS: <http://scholar.google.com/citations?hl=en&user=jkW9Dz4AAAAJ>

Selected Invited talks

The last few years, I’ve given between 5-10 invited presentations per year. The full list of presentations, with more than 100 entries in 16 different countries, is available at my homepage <http://mina4-49.mc2.chalmers.se/~gojo71/Presentations.html>.

Some recent invited workshop/conference talks include:

- *"Waveguide QED with photons and phonons"*, Mesoscopic Transport and Quantum Coherence, Espoo, Finland, 5-8th of August 2017.
- *"The giant acoustic atom - a quantum system with a deterministic time delay"*, SAWtrain Workshop, Cargèse, Corsica, France, 10-21st of July 2017.
- *"Detecting and generating propagating microwave photons"*, QNANO, Yokohama, Japan, 23-24th of March 2017.
- *"Quantum Optics and Quantum Acoustics in waveguide circuit QED"*, The 4th International Workshop on Frontiers in Quantum Optics and Quantum Information: Optomechanics meets circuit QED, Beijing on June 15 - 18, 2016.
- *"Colloquium: Waveguide QED in superconducting circuits - an atom in front of a mirror, quantum sound and a giant atom"*, Institut für Komplexe Quantensysteme, Universität Ulm, Ulm, May 13th 2016.
- *"Colloquium: Exploring atomic and relativistic physics in superconducting circuits "*, Institute of Photonics and Quantum Sciences, Heriot-Watt University, Edinburgh, March 2nd 2016.
- *"An introduction to circuit quantum electrodynamics"*, Microwaves Go Quantum, Physikzentrum Bad Honnef, November 16-20th 2015.
- *"Counting propagating microwave photons and generating single phonon"*, Towards thermodynamics with quantum systems, Les Pourquerolles, France 11-16th of October, 2015
- *"Using Scattering Theory for Photons in Circuit QED"*, Charge Transfer meets Circuit Quantum Electrodynamics, Workshop at MPI Dresden, Germany, June 29th - July 3rd 2015.
- *"Non-absorbing (QND) detection of photons"*, DARPA Single Photon Detector Workshop, Washington D.C., January 20-21st 2015.

- *"Simulating relativistic physics in superconducting circuits"*, Advanced many-body and statistical methods in mesoscopic systems, Brasov, Romania, September 1-5th 2014.
- *"The twin paradox with macroscopic clocks in superconducting circuits"*, Condensed Matter in Paris: CMD25-JMC14, Paris, August 25-29th 2014.
- *"Microwaves and phonons in 1D transmission lines: Giant Cross-Kerr effect, QND Photon Detection and Giant Atoms"*, PRACQSYS 2014, Cambridge, UK, August 4-8th 2014.
- *"Quantum Information and Relativistic Physics in Superconducting Circuits"*, Two lectures in the CSIC/QUITEMAD Quarter on Quantum Field Theory for Quantum Information, Madrid, Spain, November 12-14th 2013.
- *"Theory of the dynamical Casimir effect in superconducting circuits"*, PIERS 2013, Stockholm, Sweden, August 12-15th 2013.
- *"Microwave photon detection based on the cross-Kerr effect"*, PIERS 2013, Stockholm, Sweden, August 12-15th 2013.
- *"Simulating relativistic motion in superconducting circuits"*, Relativistic Quantum Information Workshop - North, Nottingham, UK, June 24-27th 2013.
- *"Producing correlated photons using superconducting circuits"*, CLEO/Europe-IQEC 2013, München, Germany, May 12-16th 2013.
- *"The Dynamical Casimir effect in Superconducting Circuits"*, 12th International Conference on Squeezed States and Uncertainty Relations, Brazil, 2-6 May 2011.
- *"Dynamical Casimir Effect in a Superconducting Coplanar Waveguide"*, QNANO, Swedish-Japanese workshop, Tokyo, 13-14th of November 2009.
- *"Superconducting Qubits and Few Qubit Experiments"*, QIPC 2007, International Conference on Quantum Information Processing and Communication, Barcelona, Spain, 15-19th of October 2007.

Selected outreach activities

- *"Why I want to build a Quantum Computer"*, TEDx Göteborg: A Brave New World, Sweden, 23rd of October 2017
- *"Quantum Technology and Quantum Computing"*, NASDAQ Stockholm Tech Event, Stockholm, Sweden, 11th of October 2017
- *"Kvantfysik - från atomteori till kvantdatorer"*, Fysikens Dag, Vetenskapsfestivalen, Göteborg, April 16th (2016).
- Interview in Swedish Radio (Ekot) about "Talking with atoms" (2014)
- Short popular science text in "Allt om Vetenskap" about "Talking with atoms" (2014)
- Three interviews in SR Göteborg popular science show "Einsteins trädgård" (2010, 2012, 2014)
- *"Fysikens retorik = formler + bilder + ord"*, Symposium on Rhetorics in Science at the Royal Society of Arts and Sciences in Gothenburg, October 8th 2013. The proceedings were published in 2015.
- Interview in Swedish Television news (Västnytt and Landet Runt) about the dynamical Casimir effect (2011)
- Live interview in Swedish Radio (SR Göteborg) morning show about the Nobel Prize in Physics 2012
- Interview in Swedish Radio (SR P3) popular science show "Instituttet" (2012)

- Wrote a popular text on "Vacuum" in the Swedish popular science magazine "Forskning och Framsteg" (2012)
- Lecture at Göteborgs Läkaresällskap (Gothenburg Medical Doctors' Association) on the Nobel Prize in Physics 2012.

International and National Network

Collaborations with experimental groups

Internationally, my small group has collaborated on quantum measurement and feedback with the group of *Leo DiCarlo in Delft*, which has so far resulted in two joint PRLs[#10 and 20 in my publication list].

We've analyzed an experiment performed in the group of *David Pappas at NIST, Boulder*, resulting in a joint publication in New Journal of Physics[#33].

We've also started a collaboration on non-classical photon sources with *Max Hofheinz in Grenoble*, so far resulting in a theory paper published in PRL [#5]. This collaboration and discussions with *Fabien Portier* at CEA Saclay is the main motivation for the work on the microwave photon emission from voltage biased Josephson junctions [#3, 5(PRL), 17, 23(PRL)].

Locally, our collaboration with the group of *Per Delsing* works excellently and has resulted in numerous joint publications.

Recently, we also collaborated with the group of *Sergey Kubatkin*, resulting in two joint publications[#21 (PRL), 32], and also with the group of *Mikael Käll* and *Timur Shegai* expanding into quantum plasmonics, resulting in one joint publication [34]. This also resulted in a joint Environment on Quantum Plasmonics, supported by the Swedish Research Council with 4 MSEK/year for six years from 2017-2022.

Collaborations with theoretical groups

I have a long-standing collaboration with the group of *Franco Nori at RIKEN* in Japan, and in particular with my former PhD-student *Robert Johansson*. The collaboration has been mainly on the dynamical Casimir effect and has so far resulted in five joint publications[15, 28, 41, 44, 47]. My former PhD student Anton Frisk Kockum joined Nori's group in April 2015.

In the EU STREP PROMISCE on microwaves propagating in open transmission lines, we are collaborating with the groups of *Enrique Solano from the University of Bilbao* and *Borja Peropadre* from the group of *Juan Jose Garcia-Ripoll in Madrid* (from Quantum Optics theory) resulting in six joint publications[12, 24, 29, 30, 40, 42].

We also benefitted from a STINT collaboration grant between Chalmers and the group of *Gerard Milburn at University of Queensland (UQ)*. We collaborate mainly on microwaves propagating in open transmission lines, resulting so far in three joint PRLs [9, 22, 25] and one PRB [16] and one additional submitted review paper.

On relativistic quantum information, we are collaborating with the group of *Ivette Fuentes in Nottingham*, resulting so far in six joint publications [2, 7, 11, 12, 18, 29 (PRL)]. She has now moved to Vienna and my former PhD student Joel Lindkvist will join her group as a post-doc in September 2016.

In PRA, we recently published an analysis of a setup for steady-state entanglement of two qubits in a cavity together with the group of *Anders S. Sørensen in Copenhagen*[26].

On quantum memories in the form of ensembles of rare-earth atoms in optical crystals, we've collaborated with *Geneva University* represented by *Mikael Afzelius* and *Nicolas Sangouard*, resulting in two joint publications[31, 37].

Teaching experience

Since 2017, I'm teaching the second year bachelor's course in Quantum Physics at Göteborg University. I have been teaching two 7.5 ECTS Master's level courses: Between 2005-2013, "Quantum Informatics and Quantum Optics" and between 2014-2016, "Non-equilibrium Processes". Between 2008-2010, I was the coordinator of the Masters program in Nanoscale Science and Technology. From 2010-2014, I was the local coordinator of our international Erasmus Mundus Master program in Nanoscale Science and Technology, run in collaboration with universities in Leuven, Dresden and Grenoble.