

# **SCALEQIT International Conference 2016**

## **Program and List of Participants**



De Lindenhof and TU Delft Culture Center

Delft, The Netherlands

January 27 to 29, 2016

Version 1

## Wednesday, January 27

### Location: De Lindenhof

8:00 Walk from Museum Hotel to De Lindenhof (Meet Leo DiCarlo in front of Museum Hotel, Oude Kerk exit)  
8:15 Bus leaves Hampshire Hotel for De Lindenhof

8:30-9:00 **Registration**

9:00-9:30 Welcome and introduction by Goran Wendin, Leo DiCarlo and Hans Mooij

**Early-morning session:** Chaired by Hans Mooij

9:30-10:00 Austin Fowler, Google

*Using surface code experimental output correctly and effectively*

10:00-10:30 Matthias Steffen, IBM

*Small quantum codes with superconducting qubits*

10:30-11:00 **Coffee break**

**Mid-morning session:** Chaired by Andreas Wallraff

11:00-11:30 Leo DiCarlo, Delft University of Technology

*TBD*

11:30-12:00 Rami Barends, Google

*Digital quantum simulations of adiabatic algorithms and fermionic models*

12:00-13:30 **Lunch**

**Early-afternoon session:** Chaired by Barbara Terhal

13:30-14:00 Enrique Solano, University of the Basque Country

*Complexity simulating complexity versus universal quantum machines*

14:00-14:30 Andreas Wallraff, ETH Zurich

*Quantum simulation with superconducting circuits*

14:30-15:00 **Coffee break**

**Mid-afternoon session:** Chaired by Lieven Vandersypen

15:00-15:30 Patrice Bertet

*Magnetic resonance at the quantum limit*

15:30-16:00 Karl Petersson, University of Copenhagen

*Semiconductors for superconducting qubits*

16:00-17:30 Poster session **with beer and canapes**

17:30-18:00 SCALEQIT business

18:00+ Dinner on your own. Recommendations in conference booklet.

**Thursday, January 28**  
**Location: De Lindenhof**

8:30 Bus leaves Hampshire Hotel for De Lindenhof

**Early-morning session:** Chaired by Enrique Solano

- 9:00-9:30 Matthias Troyer, ETH Zurich  
*Quantum annealing and simulated quantum annealing*
- 9:30-10:00 Mohammad Amin, D-Wave Systems  
*Quantum Boltzmann machine*
- 10:00-10:30 Daniel Lidar  
*Error correction for quantum annealing*
- 10:30-11:00 **Coffee break**

**Mid-morning session:** Chaired by David DiVincenzo

- 11:00-11:30 Frank Deppe, Walther Meissner Institute  
*Displacement of propagating squeezed microwave states*
- 11:30-12:00 Frank Wilhelm-Mauch, Saarland University  
*How to make a good quantum gate on your superconducting quantum processor, and how to know that you made it*
- 12:00-13:30 **Lunch**

**Early-afternoon session:** Chaired by Daniel Esteve

- 13:30-14:00 Ronald Hanson, University of the Basque Country  
*Quantum networks of diamond spins for computing and communication*
- 14:00-14:30 Mika Sillanpaa, Aalto University  
*Optomechanics at microwave frequencies: mechanical resonators coupled to cavities and qubits.*
- 14:30-15:00 **Coffee break**

**Mid-afternoon session:** Chaired by Lieven Vandersypen

- 15:00-15:30 Per Delsing, Chalmers University  
*Quantum acoustics*
- 15:30-16:00 Andrei Petrenko, Yale University  
*Extending the lifetime of a qubit through quantum error correction*

16:00-17:30 Poster session **with beer and canapes**

17:30-18:00 SCALEQIT business

19:00+ **Dinner at De Prinsenkelder**  
<http://www.de-prinsenkelder.nl/>  
Schoolstraat 11, 2611 HS Delft (right next to Museum Hotel)

**Friday, January 29**  
**Location: TU Delft Culture Center**

8:30 Bus leaves Hampshire Hotel for TU Delft Culture Center

**Early-morning session:** Chaired by Frank Wilhelm

- 9:00-9:30 Peter Love, Tufts University  
*Sparse methods for quantum computation applied to quantum chemistry*
- 9:30-10:00 Ryan Babbush, Google  
*Towards an experimentally viable variational quantum eigensolver with superconducting qubits*
- 10:00-10:30 Allan Geller, Microsoft  
*Software tool chains for quantum computing*
- 10:30-11:00 **Coffee break**

**Mid-morning session:** Chaired by Goran Johansson

- 11:00-11:30 Benjamin Huard, Ecole Normale Supérieure  
*Decoding and using the information contained in the fluorescence of a qubit*
- 11:30-12:00 Mazyar Mirrahimi, INRIA  
*Universal quantum computation with Schrödinger cat states*
- 12:00-13:30 **Lunch**

**Early-afternoon session:** Chaired by Goran Wendin

- 13:30-14:00 Christopher Eichler, Princeton University  
*Microwave radiation for quantum simulation in superconducting circuits and semiconductor quantum dots*
- 14:00-14:30 Sadik Hafizovic, Zurich Instruments  
*Startup in a saturated market?*
- 14:30-15:00 Closing discussion: *Quantum engineering and quantum industry*

**Tour**

- 15:00-15:30 Walk to QuTech/Kavli
- 15:30-16:00 **Coffee and snacks**
- 16:00 – 17:00 Lab and cleanroom tours
- 17:00+ Departure

## List of Posters

1. *Benchmarking arbitrary quantum gates*

T. Chasseur, D. M. Reich, C. P. Koch, and F. K. Wilhelm

2. *On the physical realizability of quantum stochastic walks*

B.G. Taketani, L. Govia, P. Schuhmacher, and F. K. Wilhelm

3. *Optimal control using single flux quantum pulses*

P. J. Liebermann and F. K. Wilhelm

4. *Fast and precise simultaneous gates in frequency-crowded multilevel systems using robust analytic controls*

L. S. Theis, F. Motzoi, and F. K. Wilhelm

5. *Simulation of many-body Pauli strings on a superconducting quantum device using the  $(XX+YY)$ -interaction*

M. P. Kaicher, F. Motzoi and F. K. Wilhelm

6. *A method to efficiently simulate the thermodynamic properties of the Fermi-Hubbard model on a quantum computer*

P.-L. Dallaire-Demers and F. K. Wilhelm

7. *Quantum transport of ultracold atoms*

S. Krinner, D. Husmann, M. Lebrat, S. Häusler, C. Grenier, J.-P. Brantut, T. Esslinger

8. *Digital quantum simulation of spin models with circuit quantum electrodynamics*

Y. Salathé, M. Mondal, M. Oppliger, J. Heinsoo, P. Kurpiers, A. Potočnik, A. Mezzacapo, U. Las Heras, L. Lamata, E. Solano, S. Filipp, and A. Wallraff

9. *Entanglement distillation in circuit quantum electrodynamics*

M. Oppliger, J. Heinsoo, Y. Salathé, A. Potočnik, G. S. Paraoanu, M. Mondal, and A. Wallraff

10. *Engineering photon interactions in waveguide QED*

R.D. Buijs, S. Gasparinetti, M. Pechal, B. K. Mitchell, M. Oppliger, M. Mondal, A. Potočnik, A. A. Abdumalikov, and A. Wallraff.

11. *Active quantum error correction in a diamond quantum processor<sup>1</sup>.*

J. Cramer, N. Kalb, M. A. Rol, B. Hessen, M. S. Blok, M. Markham, D. J. Twitchen, R. Hanson, and T. H. Taminiau

12. *Circuit design implementing longitudinal coupling: a scalable scheme for superconducting qubits*

S. Richer and D. DiVincenzo

13. *Stochastic master equation analysis of multi-qubit measurements in circuit QED*

D. Ben Criger and David DiVincenzo

14. *Digital-analog and digital adiabatic quantum computing*

L.García-Álvarez, U. Las Heras, M. Sanz, L. Lamata, and E. Solano

15. *Digital quantum simulations with superconducting circuits*

U. Las Heras, L. García-Álvarez, L. Lamata, and E. Solano

16. *Quantum memristors and neuromorphic quantum computation*

M. Sanz, L. Lamata and, E. Solano

17. *Stimulated Raman adiabatic passage using a three-level superconducting circuit*

K. S. Kumar, A. Vepsäläinen, S. Danilin, and G. S. Paraoanu.

18. *Probability distributions of continuous measurement results for conditioned quantum evolution*

A. Franquet and Yu. V. Nazarov

19. *Paving the road towards a cryogenic qubit control platform*

H. Homulle, V. Patra, R. Incandela, B. Valizadehpasha, L. Song, M. Babaie, F. Sebastiano, and E. Charbon

20. *Circuit QED in the ultra-strong coupling regime using a vacuum-gap transmon*

S. J. Bosman, M. F. Gely, V. Singh, D. Bothner, and G. A. Steele

21. *One minute parity lifetime of a NbTiN Cooper-pair transistor*

D. van Woerkom, A. Geresdi, and L. P. Kouwenhoven

22. *Effects of the electrostatic environment on the Majorana nanowire devices*

A. Vuik, D. Eeltink, A. Akhmerov, and M. Wimmer

23. *Coupling spin qubits with high kinetic inductance resonators*

N. Samkharadze, A. Bruno, P. Scarlino, G. Zheng, D. P. DiVincenzo, L. DiCarlo, and L. M. K. Vandersypen

24. *Active resonator reset in the non-linear regime to improve multi-round quantum parity checks in circuit QED*

C. C. Bultink, M. A. Rol, R. Vermeulen, X. Fu, B.C.S. Dikken, J. C. de Sterke, A. Bruno, R. N. Schouten, and L. DiCarlo

25. *Independent, extensible control of same-frequency superconducting qubits by selective broadcasting*

S. Asaad, C. Dickel, S. Poletto, A. Bruno, N. K. Langford, M. A. Rol, D. Deurloo, and L. DiCarlo

## Program at a glance

	Wed 27 @ De Lindenhof	Thurs 28 @ De Lindenhof	Fri 29 @ TU Delft
8:00	Walk: Museum to Lindenhof		
8:15	BUS: Hampshire to Lindenhof		
8:30	Registration	BUS: Hampshire to Lindenhof	BUS: Hampshire to TUD
9:00	Welcome & Intro	Matthias Troyer	Peter Love
9:30	Austin Fowler	Mohammad Amin	Ryan Babbush
10:00	Matthias Steffen	Daniel Lidar	Alan Geller
10:30	COFFEE BREAK	COFFEE BREAK	COFFEE BREAK
11:00	Leo DiCarlo	Frank Deppe	Benjamin Huard
11:30	Rami Barends	Frank Wilhelm	Mazyar Mirrahimi
12:00	LUNCH	LUNCH	LUNCH
12:30			
13:00			
13:30	Enrique Solano	Ronald Hanson	Christopher Eichler
14:00	Andreas Wallraff	Mika Sillanpaa	Sadik Hafizovic
14:30	COFFEE BREAK	COFFEE BREAK	Discussion: Q. Engineering
15:00	Patrice Bertet	Per Delsing	Walk to QuTech/Kavli
15:30	Karl Petersson	Andrei Petrenko	SNACKS
16:00	POSTER SESSION	POSTER SESSION	LAB TOURS
16:30			
17:00			DEPARTURE
17:30	SCALEQIT BUSINESS	SCALEQIT BUSINESS	
18:00	FREE TIME	FREE TIME	
18:30			
19:00		CONFERENCE DINNER	

## List of Participants

#	Last Name	First Name	Affiliation	Email
1	Alfaro Barrantes	Juan Andres	QuTech, Delft University of Technology	a.alfarobarrantes@tudelft.nl
2	Garcia Alvarez	Laura	University of the Basque Country	garcia.alvarez.la@gmail.com
3	Amin	Mohammad	D-Wave Systems	amin@dwavesys.com
4	Babbush	Ryan	Google	babbush@google.com
5	Barends	Rami	Google	rbarends@physics.ucsb.edu
6	Bertet	Patrice	CEA Saclay	patrice.bertet@cea.fr
7	Bosco	Stefano	RWTH Aachen	bosco@physik.rwth-aachen.de
8	Bosman	Sal	Delft University of Technology	s.j.bosman@tudelft.nl
9	Bruno	Alessandro	QuTech, Delft University of Technology	a.bruno@tudelft.nl
10	Buijs	Robin	ETH Zurich	robin.buijs@phys.ethz.ch
11	Bultink	Niels	QuTech, Delft University of Technology	c.c.bultink@tudelft.nl
12	Bylander	Jonas	Chalmers University	jonas.bylander@chalmers.se
13	Campagne-Ibarcq	Philippe	CEA Saclay	philippe.campagne@lpa.ens.fr
14	Chasseur	Tobias	Saarland University	tch@lusi.uni-sb.de
15	Cramer	Julia	QuTech, Delft University of Technology	j.cramer@tudelft.nl
16	Criger	Ben	RWTH Aachen	bcriger@gmail.com
17	Dallaire-Derners	Pierre-Luc	Saarland University	dallairedemers@gmail.com
18	Danilin	Sergey	Aalto University	sergey.danilin@aalto.fi
19	Delsing	Per	Chalmers University	per.delsing@chalmers.se
20	Deppe	Frank	Walther Meissner Institute	frank.deppe@wmi.badw-muenchen.de
21	Deurloo	Duije	QuTech, Dutch Research Organization	duije.deurloo@tno.nl
22	DiCarlo	Leo	QuTech, Delft University of Technology	l.dicarlo@tudelft.nl
23	Dickel	Christian	QuTech, Delft University of Technology	c.dickel@tudelft.nl
24	DiVincenzo	David	RWTH Aachen	d.divincenzo@fz-juelich.de
25	Eichler	Christopher	Princeton University	ceichler@princeton.edu
26	Eriksson	Mark	University of Wisconsin	maeriksson@wisc.edu
27	Esteve	Daniel	CEA Saclay	daniel.esteve@cea.fr
28	Fowler	Austin	Google	austingfowler@gmail.com
29	Franquet Gonzalez	Albert	Delft University of Technology	a.franquetgonzalez@tudelft.nl
30	Fu	Xiang	QuTech, Delft University of Technology	x.fu-1@tudelft.nl
31	Geller	Alan	Microsoft	alan.geller@microsoft.com
32	Geresdi	Attila	QuTech, Delft University of Technology	a.geresdi@tudelft.nl
33	Hafizovic	Sadik	Zurich Instruments	sadik.hafizovic@zhinst.com
34	Hanson	Ronald	QuTech, Dutch Research Organization	r.hanson@tudelft.nl
35	Heinsoo	Johannes	ETH Zurich	jheinsoo@phys.ethz.ch
36	Homulle	Harald	QuTech, Delft University of Technology	h.a.r.homulle@tudelft.nl
37	Huard	Benjamin	Ecole Normale Supérieure	benjamin.huard@ens.fr
38	Johansson	Goran	Chalmers University	goran.l.johansson@chalmers.se
39	Kaicher	Michael	Saarland University	michikaicher23@gmail.com
40	Kounalakis	Marios	QuTech, Delft University of Technology	m.kounalakis@tudelft.nl
41	Kouwenhoven	Leo	QuTech, Delft University of Technology	l.p.kouwenhoven@tudelft.nl
42	Kueng	Bruno	Zurich Instruments	bruno.kueng@zhinst.com
43	Lamata	Lucas	University of the Basque Country	lucas.lamata@gmail.com



44	Langford	Nathan	QuTech, Delft University of Technology	n.k.langford@tudelft.nl
45	Lidar	Daniel	University of Southern California	lidar@usc.edu
46	Liebermann	Per	Saarland University	per@lusi.uni-sb.de
47	Love	Peter	Tufts University	peter.love@tufts.edu
48	Luthi	Florian	QuTech, Delft University of Technology	f.luthi@tudelft.nl
49	Michalak	David	Intel	david.j.michalak@intel.com
50	Mirrahimi	Mazyar	Inria	mazyar.mirrahimi@inria.fr
51	Mondal	Mintu	ETH Zurich	mintu.mondal@phys.ethz.ch
52	O'Brien	Thomas	Leiden University	obrien@lorentz.leidenuniv.nl
53	Ofek	Nissim	Yale University	nissim.ofek@yale.edu
54	Oppliger	Markus	ETH Zurich	markus.oppliger@phys.ethz.ch
55	Petersson	Karl	University of Copenhagen	karl.petersson@nbi.ku.dk
56	Petrenko	Andrei	Yale University	andrei.petrenko@yale.edu
57	Poletto	Stefano	QuTech, Dutch Research Organization	s.poletto@tudelft.nl
58	Richer	Susanne	RWTH Aachen	richer@physik.rwth-aachen.de
59	Rol	Adriaan	QuTech, Delft University of Technology	m.a.rol@tudelft.nl
60	Sagastizabal	Ramiro	QuTech, Delft University of Technology	r.e.sagastizabal@tudelft.nl
61	Salathe	Yves	ETH Zurich	ysalathe@phys.ethz.ch
62	Samkharadze	Nodar	QuTech, Delft University of Technology	n.samkharadze-1@tudelft.nl
63	Sans	Mikel	University of the Basque Country	mikel.sanz@ehu.es
64	Schneider	Ben	Chalmers University	bens@chalmers.se
65	Shumeiko	Vitaly	Chalmers University	vitaly.shumeiko@chalmers.se
66	Sillanpaa	Mika	Aalto University	mika.sillanpaa@aalto.fi
67	Solano	Enrique	University of the Basque Country	enr.solano@gmail.com
68	Steele	Gary	Delft University of Technology	g.a.steele@tudelft.nl
69	Steffen	Matthias	IBM	msteffe@us.ibm.com
70	Taketani	Bruno	Saarland University	taketani@lusi.uni-sb.de
71	Taminiau	Tim	QuTech, Delft University of Technology	t.h.taminiau@tudelft.nl
72	Terhal	Barbara	RWTH Aachen	bterhal@gmail.com
73	Theis	Lukas	Saarland University	lukas.theis92@gmail.com
74	Trifunovic	Miki	QuTech, Delft University of Technology	m.trifunovic@tudelft.nl
75	Troyer	Matthias	ETH Zurich	troyer@phys.ethz.ch
76	Vandersypen	Lieven	QuTech, Delft University of Technology	svarsamo@gmail.com
77	Varsamopoulos	Savvas	QuTech, Delft University of Technology	svarsamo@gmail.com
78	Versluis	Richard	QuTech, Dutch Research Organization	richard.versluis@tno.nl
79	Vlothuizen	Wouter	QuTech, Dutch Research Organization	wouter.vlothuizen@tno.nl
80	Wallraff	Andreas	ETH Zurich	andreas.wallraff@phys.ethz.ch
81	Wendin	Goran	Chalmers University	goran.wendin@chalmers.se
82	Wilhelm-Mauch	Frank	Saarland University	fwm@lusi.uni-sb.de
83	Wimmer	Michael	QuTech, Delft University of Technology	m.t.wimmer@tudelft.nl
84	van Woerkom	David	QuTech, Delft University of Technology	d.j.vanwoerkom@tudelft.nl