

# Pol Forn-Díaz

## Curriculum Vitae

*Institute for Quantum Computing,  
University of Waterloo,  
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*ResearcherID: G-5134-2010*

### Education

- 2005–2010 **Ph.D. Physics**, *Technische Universiteit Delft*, Delft, The Netherlands.  
Thesis title: 'Superconducting qubits and quantum resonators' defended on September 27th, 2010. Advisors: Prof. J. E. Mooij, Dr. C. J. P. M. Harmans.
- 2004–2005 **Exchange Student**, *Uppsala Universitet*, Uppsala, Sweden.  
Erasmus program, research project advisor: Dr. V. Pavlenko.
- 2000–2005 **BSc Physics**, *University of Barcelona*, Barcelona, Spain.  
July 2005, Grade 2.35/4.00 (8.22/10).

### Research Experience

- 2013–Present **Postdoctoral Fellow**, *Institute for Quantum Computing, University of Waterloo*, Waterloo, Canada.  
Ultrastrong coupling of a superconducting qubit to a transmission line. Advisors: Dr. C. M. Wilson, Dr. A. Lupascu.
- 2011–2013 **Postdoctoral Researcher**, *California Institute of Technology*, Pasadena, U.S.  
Atom-photon interface in a photonic crystal waveguide. Advisor: Prof. H. J. Kimble.
- 2010–2011 **Visiting Scholar**, *Massachusetts Institute of Technology*, Cambridge, U.S.  
Decoherence of flux qubits induced by a SQUID detector. Advisor: Prof. W. D. Oliver.
- 2005–2010 **Ph.D. Physics**, *Technische Universiteit Delft*, Delft, The Netherlands.  
Superconducting flux qubits coupled to quantum resonators. Advisors: Prof. J. E. Mooij, Dr. C. J. P. M. Harmans.

### Fellowships and Scholarships

- 2013 **IQC Postdoctoral Fellowship**, *Institute for Quantum Computing, University of Waterloo*, Role on the grant: postdoctoral research in superconducting devices for quantum information.
- 2004 **Erasmus Scholarship**, *University of Barcelona*, Role on the grant: student/researcher at Uppsala University.

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## Publications

- [9] *Ultrastrong coupling of a single artificial atom to an electromagnetic continuum in the nonperturbative regime*, **P. Forn-Díaz**, J. J. García-Ripoll, B. Peropadre, M. A. Yurtalan, J.-L. Orgiazzi, R. Belyansky, C. M. Wilson and A. Lupascu, *Nature Physics* **13**, 39 (2017).
- [8] [OA] *Broken selection rule in the Quantum Rabi model*, **P. Forn-Díaz**, G. Romero, C. J. P. M. Harmans, E. Solano, and J. E. Mooij, *Scientific Reports* **6**, 26720 (2016).
- [7] *Two frequency Jahn-Teller systems in circuit QED*, T. Dereli, Y. Gül, **P. Forn-Díaz**, and O. Müstecaplıoğlu, *Physical Review A* **85**, 053841 (2012).
- [6] *Driven dynamics of a qubit tunably coupled to a harmonic oscillator*, S. Gustavsson, J. Bylander, F. Yan, **P. Forn-Díaz**, V. Bolkhovskiy, D. Braje, G. Fitch, K. Harrabi, D. Lennon, J. Miloshi, P. Murphy, R. Slattery, S. Spector, B. Turek, T. Weir, P. B. Welander, F. Yoshihara, D. G. Cory, Y. Nakamura, T. P. Orlando, and W. D. Oliver, *Physical Review Letters* **108**, 170503 (2012).
- [5] *Low bandgap superconducting single photon detector for infrared sensitivity*, S. Dorenbos, **P. Forn-Díaz**, T. Fuse, A. H. Verbruggen, T. Zijlstra, T. M. Klapwijk, and V. Zwiller, *Applied Physics Letters* **98**, 251102 (2011). Citations: 33.
- [4] *Observation of the Bloch-Siegert shift in a Qubit-Oscillator System in the Ultrastrong Coupling Regime*, **P. Forn-Díaz**, J. Lisenfeld, D. Marcos, J. J. García-Ripoll, E. Solano, C. J. P. M. Harmans, and J. E. Mooij, *Physical Review Letters* **105**, 237001 (2010). Citations: 333.
- [3] *Strong Coupling of a Quantum Oscillator to a Flux Qubit at its Symmetry Point*, A. Fedorov, A. K. Feofanov, P. Macha, **P. Forn-Díaz**, C. J. P. M. Harmans, and J. E. Mooij, *Physical Review Letters* **105**, 060503 (2010). Citations: 126.
- [2] *Switchable ultrastrong coupling in circuit QED*, B. Peropadre, **P. Forn-Díaz**, E. Solano, and J. J. García-Ripoll, *Physical Review Letters* **105**, 023601 (2010). Citations: 111.
- [1] *Josephson squeelch filter for quantum nanocircuits*, **P. Forn-Díaz**, R. N. Schouten, W. A. den Braver, J. E. Mooij, and C. J. P. M. Harmans, *Applied Physics Letters* **95**, 042505 (2009). Article selected by the *Virtual Journal of Quantum Information* and the *Virtual Journal of Superconductivity*.

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## Teaching Experience

- 2016 **Developed and taught**, *Microwave quantum optics in superconducting circuits*, 4-lecture module from course *Selected advanced topics in quantum information*, Institute for Quantum Computing, University of Waterloo.
- 2015 **Taught two lectures**, *Electronic Circuits and Integration*, 1st year undergraduate course, University of Waterloo.
- 2014 **Teaching assistant**, *Physics of the superconducting devices*, given by sir Anthony Leggett, Institute for Quantum Computing, University of Waterloo.
- 2008 **Teaching assistant**, *Computational Science Course*, 2nd year BSc Physics, Technische Universiteit Delft.

2006–2008 **Teaching assistant**, *Electromagnetism II Course*, 3d year BSc Physics, Technische Universiteit Delft.

### Service and Leadership Experience

**Ad hoc Reviewer**, *Physical Review Letters, Physical Review B, Physical Review A, New Journal of Physics, Applied Physics Letters, Journal of Physics B, European Journal of Physics, International Journal of Modern Physics B*.

2012 **Co-organizer**, *Postdoctoral and Graduate Student Seminars*, Institute of Quantum Information and Matter (IQIM), California Institute of Technology, U.S.

2008–10 **Evaluator of Master theses**, *Physics department*, Technische Universiteit Delft, The Netherlands.

### Supervision and Mentorship Experience

2016 **Co-supervisor PhD thesis**, *Quantum heat engines with superconducting circuits*, by A. M. Vadiraj, Institute for Quantum Computing, Canada.

2016 **Co-supervisor Master thesis**, *Quantum simulation of lattice gauge theories*, by Christopher Warren, Institute for Quantum Computing, Canada.

2015 **Co-supervisor Master thesis**, *Towards entanglement generation with a Josephson parametric amplifier*, by Sandbo Chang, Institute for Quantum Computing, Canada.

2014 **Supervisor Master thesis**, *A readout method for a flux-qubit resonator system in the ultrastrong coupling regime*, by Ceren Burcak Dag, Institute for Quantum Computing, Canada.

2009 **Supervisor Master thesis**, *Strong coupling in a flux qubit-resonator system*, by Dorin Cerbu, Technische Universiteit Delft, The Netherlands.

2009 **Supervisor Bachelor thesis**, *The Josephson junction as a bandpass filter*, by Ahmet Taspinar, Technische Universiteit Delft, The Netherlands.

2008 **Supervisor Master thesis**, *Coupled gradiometer flux qubits*, by Gijs de Lange, Technische Universiteit Delft, The Netherlands.

### Congresses and workshops

09/2016 **Invited Talk**, *Ultrastrong coupling in open space*, International Workshop on Ultra-Strong Light-Matter Interactions, Bilbao, Spain.

03/2016 **Contributed Talk**, *Ultrastrong coupling in a flux qubit-transmission line system*, APS March Meeting Conference, Baltimore, U.S.

03/2015 **Contributed Talk**, *Strong qubit-photon interactions in a superconducting 1D open space*, APS March Meeting Conference, San Antonio, U.S.

02/2015 **Contributed Talk**, *Strong qubit-photon interactions in a superconducting 1D open space*, Workshop on Quantum Simulations, Benasque, Spain.

01/2014 **Contributed Talk**, *An on-chip atom-photon interface using photonic nanostructures*, Quantum Innovators Workshop, Waterloo (Ontario), Canada.

11/2009 **Contributed Talk**, *Circuit QED with flux qubits*, MicroNano Conference 2009, Delft, The Netherlands.

- 08/2009 **Invited Talk**, *Superconducting flux qubits and circuit QED*, International Workshop on Quantum Information and Solid State Systems, Bilbao, Spain.
- 03/2009 **Contributed Talk**, *Nonlinear dissipative filters for measurement protection on superconducting qubits*, APS March Meeting Conference, Pittsburgh, U.S.
- 06/2008 **Contributed Talk**, *LC resonators as flux qubit couplers*, 2nd Workshop on the Physics and Applications of Superconducting Microresonators, Utrecht, The Netherlands.
- 05/2008 **Contributed Talk**, *Coupling of Flux Qubits using a Lumped Element Resonator*, EuroSQIP workshop 2008, Hindås, Sweden.

## Seminars and Colloquiums

- 12/2016 **Invited Seminar**, *Studying the physics of the spin-boson model in a superconducting quantum circuit*, Massachusetts Institute of Technology, Cambridge MA, USA.
- 03/2016 **Seminar**, *Ultrastrong coupling of a single artificial atom to an electromagnetic continuum*, Royal Holloway University London, Egham, U.K.
- 02/2016 **Colloquium**, *Ultrastrong coupling of a single artificial atom to an electromagnetic continuum*, London Center for Nanotechnology, University College London, London, U.K.
- 02/2016 **Seminar**, *Light-matter interactions in the ultrastrong coupling regime*, RWTH Aachen University, Aachen, Germany.
- 01/2016 **Invited Colloquium**, *Light-matter interactions in the ultrastrong coupling regime*, University of Tübingen, Tübingen, Germany.
- 02/2013 **Invited Seminar**, *Cavity Quantum Electrodynamics on a chip*, California State Polytechnic University, Pomona (CA), U.S.
- 01/2013 **Invited Colloquium**, *Atom-photon interface with nanostructures*, Donostia International Physics Center (DIPC), San Sebastián, Spain.
- 08/2012 **Invited Colloquium**, *Cavity QED with microtoroidal optical resonators*, Institute for Quantum Computing (IQC), Waterloo, Canada.
- 11/2010 **Invited Seminar**, *Beyond the rotating-wave approximation in circuit QED: The Bloch-Siegert shift*, Instituto de Ciencia de Materiales de Madrid, CSIC, Madrid, Spain.
- 11/2010 **Invited Seminar**, *Beyond the rotating-wave approximation in circuit QED: The Bloch-Siegert shift*, Chemistry and Physics department of the Universidad del País Basco, Bilbao, Spain.
- 10/2010 **Invited Seminar**, *Superconducting quantum circuits: quantum information and circuit quantum electrodynamics*, Physics Department, University of Barcelona, Barcelona, Spain.
- 05/2009 **Invited Seminar**, *Superconducting flux qubits and circuit QED*, Instituto de Física Fundamental, CSIC, Madrid, Spain.

## Outreach

- 2016 **Guest speaker**, *Round table "Are we ready for the quantum age?"*, La Salle School of Business and Engineering, Barcelona.
- 2015 **Guest lecturer**, *The Undergraduate School on Experimental Quantum Information Processing (USEQIP)*, Institute for Quantum Computing, Waterloo.
- 2013 **Public lecture**, *"Touching the quantum world"*, Arenys de Mar, Spain.
- 2012 **Collaborator** of the outreach activity *Curriculum development* building a one-week lab module for high-school teachers as introduction to quantum mechanics, Institute for Quantum Information and Matter, California Institute of Technology.

## Languages

Catalan	Mothertongue
Spanish	Mothertongue
English	Proficient
French	Basic

## Professional Associations

**Advisory Member** Entanglement Partners SL (Barcelona, Spain).

**Scientific Advisory** Board of Think Tank Barcelonaqbit (Barcelona, Spain).