STEVEN TOUZARD

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National University of Singapore, Centre for Quantum Technologies,
Block S15, 3 Science Drive 2, 117543, Singapore

EDUCATION

Yale University, New Haven, USA 2014 - 2019
Department of Applied Physics
M.S. (2017) and Ph.D (2019)

Ecole Normale Supérieure de Paris-Saclay, Cachan, France 2011 - 2014
Department of Physics
B.S. in partnership with Sorbonne University (Paris, France)

Lycée du Parc, Lyon, France 2008 - 2011
Classe Préparatoire aux Grandes Ecoles
Preparation for the national entrance exam to the Grandes Ecoles

RESEARCH EXPERIENCE

National University of Singapore, Singapore
Presidential Young Professor 2022 - present
– Quantum networks of superconducting qubits mediated by telecom photons

Research fellow 2019 - 2021
– Designing and building new neutral Strontium experiment from scratch
– Cooling and trapping of single Strontium atoms in optical tweezers

Xanada Quantum Technologies Inc., Canada
External consultant 2021
– Leveraging photonic GKP states and tailored codes to obtain fault tolerance approaches with improved thresholds and lower overheads
– Applying improvements observed for biased-noise Kerr-cats to GKP qubits in a measurement-based architecture

Alice & Bob SAS, France
External consultant 2021
– Reviewing current qubit designs and experimental measurement schemes stabilizing and controlling cat qubits
– Providing insights on Alice & Bob's scientific and technological roadmap

Yale University, New Haven, USA
Research assistant 2013 - 2019
– Autonomous quantum error correction using strongly driven superconducting circuits.
– Quantum gate within a stabilized manifold of Schrödinger cat states using quantum Zeno dynamics.
– Individual readout of superconducting qubits coupled to a common resonator.
– Preparation and quantum-error-correction of Gottesman-Kitaev-Preskill grid states.

SUMMARY OF PUBLICATIONS

12 papers, 1 patent (2 Nature, 1 Science, 1 Phys. Rev. X, 2 Phys. Rev. Lett., 1 Sci. Adv., 1 PRX Quantum, 1 New J. Phys., 2 Quantum Sci. Technol., 1 Phys. Rev. Appl.)

h-index: 10; Citations: 1190

SELECTED PUBLICATIONS AND PATENTS

V.V. Albert, S.O Mundhada, A. Grimm, **S. Touzard**, M.H. Devoret, L. Jiang,
Techniques for error correction of a logical qubit and related systems and methods
Patent, WO2019164591A2, US2020334101A1, EP3735712A2 (2020).

P. Campagne-Ibarcq* & A. Eickbusch* & **S. Touzard***, *et al.*
Quantum error correction of a qubit encoded in grid states of an oscillator
Nature **584**, 368–372 (2020).
*Equal contributions

S. Touzard, *et al.*
Gated conditional displacement readout of superconducting qubits,
Phys. Rev. Lett. **122**, 080502 (2019).

S. Touzard, *et al.*
Coherent Oscillations inside a Quantum Manifold Stabilized by Dissipation,
Phys. Rev. X **8**, 021005 (2018).

Z. Leghtas, **S. Touzard**, *et al.*
Confining the State of Light to a Quantum Manifold by Engineered Two-Photon Loss,
Science **347**, 853 (2015).

ACADEMIC HONORS AND AWARDS

NRF Fellowship class of 2022	2021
IOP International Quantum Technology Emerging Researcher Award (highly commended)	2020
Four-year scholarship as Elève Normalien	2011-2014

FULL LIST OF PUBLICATIONS AND PATENTS

Y.Y. Gao, M.A. Roll, **S. Touzard**, C. Wang,
A practical guide for building superconducting quantum devices
PRX Quantum **2**, 040202 (2021)

V.V. Albert, S.O Mundhada, A. Grimm, **S. Touzard**, M.H. Devoret, L. Jiang,
Techniques for error correction of a logical qubit and related systems and methods
Patent, WO2019164591A2, US2020334101A1, EP3735712A2 (2020).

H. Liu, S.B. Jäger, X. Yu, **S. Touzard**, A. Shankar, M.J. Holland, T.L. Nicholson,
Rugged mHz-linewidth superradiant laser driven by a hot atomic beam
Phys. Rev. Lett. **125**, 253602 (2020).

P. Campagne-Ibarcq* & A. Eickbusch* & **S. Touzard***, E. Zalys-Geller, N.E. Frattini, V.V. Sivak, P. Reinhold, S. Puri, S. Shankar, R.J. Schoelkopf, L. Frunzio, M. Mirrahimi, and M.H. Devoret,
Quantum error correction of a qubit encoded in grid states of an oscillator
Nature **584**, 368–372 (2020).
*Equal contributions

A. Grimm, N.E. Frattini, S. Puri, S.O. Mundhada, **S. Touzard**, M. Mirrahimi, S.M. Girvin, S. Shankar, and M.H. Devoret,
Stabilization and operation of a Kerr-cat qubit,
Nature **584**, 205–209 (2020).

S. Puri, L. St-Jean, J.A. Gross, A. Grimm, N.E. Frattini, P.S. Iyer, A. Krishna, **S. Touzard**, L. Jiang, A. Blais, S.T. Flammia, and S.M. Girvin,
Bias-preserving gates with stabilized cat qubits
Sci. Adv. **6**, 34 (2020).

S.O. Mundhada, A. Grimm, J. Venkatraman, Z.K. Minev, **S. Touzard**, N.E. Frattini, V.V. Sivak, K.M. Sliwa, P. Rheinhold, S. Shankar, M. Mirrahimi and M.H. Devoret,
Experimental implementation of a Raman assisted six-quanta process
Phys. Rev. Appl. **12**, 054051 (2020).

S. Touzard, A. Kou, N.E. Frattini, V.V. Sivak, S. Puri, A. Grimm, L. Frunzio, S. Shankar, and M.H. Devoret,
Gated conditional displacement readout of superconducting qubits,
Phys. Rev. Lett. **122**, 080502 (2019).

V.V. Albert, S.O. Mundhada, A. Grimm, **S. Touzard**, M.H. Devoret, and L. Jiang,
Pair-cat codes: autonomous error-correction with low-order nonlinearity,
Quantum Sci. Technol. **4**, 035007 (2019).

S. Touzard, A. Grimm, Z. Leghtas, S.O. Mundhada, P. Reinhold, C. Axline, M. Reagor, K. Chou, J.Z. Blumoff, K.M. Sliwa, S. Shankar, L. Frunzio, R.J. Schoelkopf, M. Mirrahimi, and M.H. Devoret,
Coherent Oscillations inside a Quantum Manifold Stabilized by Dissipation,
Phys. Rev. X **8**, 021005 (2018).

S.O. Mundhada, A. Grimm, **S. Touzard**, U. Vool, S. Shankar, M.H. Devoret, and M. Mirrahimi,
Generating higher order quantum dissipation from lower order parametric processes,
Quantum Sci. Technol. **2**, 024005 (2017).

Z. Leghtas, **S. Touzard**, I.M. Pop, A. Kou, B. Vlastakis, A. Petrenko, K.M. Sliwa, A. Narla, S. Shankar, M.J. Hatridge, M. Reagor, L. Frunzio, R.J. Schoelkopf, M. Mirrahimi, and M.H. Devoret,
Confining the State of Light to a Quantum Manifold by Engineered Two-Photon Loss,
Science **347**, 853 (2015).

M. Mirrahimi, Z. Leghtas, V.V. Albert, **S. Touzard**, R.J. Schoelkopf, M.H. Devoret,
Dynamically protected cat qubits: a new paradigm for universal quantum computation,
New J. Phys. **16**, 045014 (2014).