

Curriculum Vitae

1 Basic information

- ♂ Male 🇮🇹 Italian
- 🏢 **Assistant Professor**, Université de Sherbrooke from 4/2026 – Now.
- 🏢 Bureau D9-1014, Institut quantique & Faculté de génie
- ✉ marco.scigliuzzo@usherbrooke.ch
- 🌐 Lab Website: <https://sqs-lab.netlify.app/>



2 Past work experience

Postdoc 11/2021-4/2026. *Swiss Federal Institute of Technology Lausanne*, Switzerland. Advisor: Tobias Kippenberg. I supervise a team of PhD and Master students working on multimode circuit Optomechanics, DUV-based traveling wave parametric amplifiers and coupled HBAR in flip chip architecture. Collaborate on giant atom in high kinetic inductance platform and high-fidelity readout projects.

3 Higher education degrees

PhD in quantum optics (3rd September 2021). *Chalmers University of Technology*, Sweden. Supervisor: Per Delsing. Thesis: Effects of the environment on quantum systems. 📖 ISBN: [978-91-7905-534-9](#).

M.Sc. Physics (22nd February 2016). *University of Salento*, Italy. 110/110 Magna cum Laude. Supervisor: Giuseppe Maruccio. Thesis: Optimization of SAW filters and resonators. 📖 [DOI](#)

4 Main Scientific Achievements

All citations refer to the “list of publications” section.

Quantum optics and quantum acoustic - I have made widely recognized contributions to circuit quantum electrodynamics and acoustodynamics, particularly in the ability to control photonic [10,11] and phononic [9,16,17] degrees of freedom in artificial systems at the quantum level. In the electromagnetic domain, I demonstrated frequency and time-domain control of a delocalized atomic excitation (atom-photon bound state) [11]. This work has opened new directions in qubit bath engineering and enabled the simulation of spin chains with all-to-all connectivity. I also contributed to implementing a Selective Number-dependent Arbitrary Phase (SNAP) gate, which generated Wigner-negative states. This technique, used to realize cubic phase states in an aluminum three-dimensional cavity for the first time [10], demonstrated full control of a universal set of quantum gates. In mechanical systems, I achieved two-mode squeezing and multimode entanglement in surface acoustic wave (SAW) resonators [9], leveraging Kerr nonlinearity for mechanical modes. During my postdoc, I contributed to advancing circuit optomechanics by developing a theoretical scheme to sense oscillations of ultra-strong vacuum via the generation of mechanical excitations [16]. This method provided measurable effects for vacuum fluctuations. Additionally, I prepared and measured the ground state of a collective ensemble ($N=6$) of mechanical resonators [17], observing quantum-mechanical



Figure 1: Optomechanical hexamer

sideband asymmetry and \sqrt{N} enhancement of optomechanical coupling—paving the way for multipartite entanglement and quantum metrology advancements.

High coherence devices - I have made critical contributions to understanding and mitigating sources of decoherence in superconducting circuits, spanning phononic [4,15], photonic [5], and two-level systems (TLS) [3] loss channels. I introduced lower bounds on losses arising from electromechanical conversion in superconducting devices fabricated on piezoelectric substrates [4]. This work has alerted the community to the importance of decoupling electric fields from piezoelectric materials to optimize superconducting and hybrid platforms (e.g., microwave-to-optical converters). I also contributed to studies showing the temporal fluctuations of TLS, highlighting the necessity for long-term statistics to fully characterize qubit coherence times [3]. This has raised awareness within the circuit QED community about the importance of statistical approaches in evaluating qubit performance. Additionally, I developed a method for mechanically switching off TLS loss channels using SAW resonators, and I introduced a qubit-photonic bath thermometer based on the thermal bath's effect on the coherence of a strongly coupled qubit [5]. This tool is now a crucial asset for quantum thermodynamics experiments. During my postdoc, I contributed to the discovery of mechanical shock effects on superconducting qubits [15], further emphasizing the need for phononic shielding in quantum technologies.

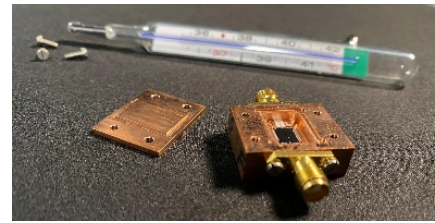


Figure 2 Packaged thermometer qubit.

Fabrication and improvements of superconducting circuits - I played a key role in advancing state-of-the-art fabrication processes now widely used in the superconducting technologies community. I contributed to the development of a three-angle evaporation method for in-situ bandaging of Josephson junctions [6]. This process, now adopted across the field, eliminates an additional lithography step and reduces contamination risks from the lift-off process. Additionally, I successfully replicated the fabrication of a traveling-wave parametric amplifier based on trilayer Nb/AlOx/Nb Josephson junctions at EPFL. Though the process itself is not new, its successful implementation enables the creation of compact, low-loss metamaterials for quantum applications. Finally, in [14,19] I contributed to developed high kinetic inductance materials at EPFL, successfully used them to study disorder in coupled cavity arrays and currently integrating them with standard aluminum fabrication [23].

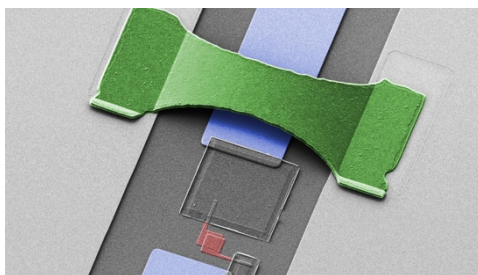


Figure 3. Josephson Junction under a bridge.

5 List of Publications

Metrics: citations 1319, H-index 16, i10-Index 17 (from Google Scholar on 26th March 2026).

Preprints in preparation and review

25. H. Li*, M **Scigliuzzo***, E. Guzvskii*, S. Han, K. Han , T. Kippenberg. Quantum-limited traveling wave parametric amplifier based on DUV lithography-defined planar structures. arXiv:2603.14455 [DOI](#)

24. G Beaulieu, JZ Chen, M **Scigliuzzo**, O Benhayoune-Khadraoui, AA Chapple, PA Spring, A Blais and P. Scarlino. Fast, high-fidelity Transmon readout with intrinsic Purcell protection via nonperturbative cross-Kerr coupling. (in review in PRX) <https://arxiv.org/abs/2601.04975>

23. V. Jouanny, L. Peyruchat, M. **Scigliuzzo**, A. Mercurio, E. Di Benedetto, D. De Bernardis, D. Sbroggiò, S. Frasca, V. Savona, F. Ciccarello and P. Scarlino. Superstrong Dynamics and Chiral Emission of a Giant Atom in a Structured Bath. (second review round in Nature Physics) <https://arxiv.org/abs/2509.01579>

EPFL affiliation (Postdoctoral researcher)

22. M **Scigliuzzo***, L. Peyruchat*, RM Marabini, C. Becker, V. Jouanny, P. Delsing, P. Scarlino. Quantum Acoustics with Tunable Nonlinearity in the Superstrong Coupling Regime. *PRX Quantum* 7, 010359 (2026) [DOI](#)

21. M Chegnizadeh*, A Youssefi*, M **Scigliuzzo**, Tobias J. Kippenberg. Compact superconducting vacuum-gap capacitors with low microwave loss and high mechanical coherence for scalable quantum circuits. *Phys. Rev. Applied* 23, 064071 (2025) [DOI](#)

20. V. Jouanny, S. Frasca, V.J. Weibel, L. Peyruchat, M. **Scigliuzzo**, F. Oppliger, F. De Palma, D. Sbroggio, G. Beaulieu, O. Zilberberg, and P. Scarlino. High kinetic inductance cavity arrays for compact band engineering and topology-based disorder meters. *Nature Communications* 16, 3396 (2025) [DOI](#)

19. L Peyruchat, F Minganti, M **Scigliuzzo**, F Ferrari, V Jouanny, F Nori, V Savona, and P Scarlino. Landau-Zener without a Qubit: Unveiling Multiphotonic Interference, Synthetic Floquet Dimensions, and Dissipative Quantum Chaos. *npj Quantum Information* 11, 62 (2025) [DOI](#)

18. G Beaulieu, F Minganti, S Frasca, M **Scigliuzzo**, S Felicetti, R Di Candia, P Scarlino. Criticality-Enhanced Quantum Sensing with a Parametric Superconducting Resonator. *PRX Quantum* 6, 020301 (2025) [DOI](#)

17. M Chegnizadeh*, M **Scigliuzzo***, A Youssefi, S Kono, E Guzovskii and T. J. Kippenberg. Quantum collective motion of macroscopic mechanical oscillators. *Science* 386 (6728), 1383-1388 (2024) [DOI](#)

16. F Minganti, A Mercurio, F Mauceri, M **Scigliuzzo**, S Savasta, V Savona. Phonon Pumping by Modulating the Ultrastrong Vacuum. *SciPost Physics* 17 (1), 027 (2024). [DOI](#)

15. S Kono, J Pan, M Chegnizadeh, X Wang, A Youssefi, M **Scigliuzzo**, T J Kippenberg. Mechanically Induced Correlated Errors on Superconducting Qubits with Relaxation Times Exceeding 0.4 Milliseconds. *Nature Communications* 15 (1), 3950 (2024). [DOI](#)

14. S Frasca, I N Arabadzhiev, S Yves Bros de Puechredon, F Oppliger, V Jouanny, R Musio, M **Scigliuzzo**, F Minganti, P Scarlino, and E Charbon. High-Kinetic Inductance NbN Films for High-Quality Compact Superconducting Resonators. *Physical Review Applied* 20 (4), 044021 (2023). [DOI](#)

13. A Osman, J Fernández-Pendàs, C Warren, S Kosen, M **Scigliuzzo**, A Frisk Kockum, G Tancredi, A Fadavi Roudsari, and J Bylander. Mitigation of Frequency Collisions in Superconducting Quantum Processors. *Physical Review Research* 5 (4), 043001 (2023). [DOI](#)

Chalmers affiliation (PhD student)

12. A M Ali, C Castillo Moreno, S Sundelin, J Biznárová, M **Scigliuzzo**, K Patel, A Osman, D P Lozano, I Strandberg, and S Gasparinetti. Engineering Symmetry-Selective Couplings of a Superconducting Artificial Molecule to Microwave Waveguides. *Physical Review Letters* 129, 12123604 (2022). [DOI](#)

11. M **Scigliuzzo**, G Calajò, F Ciccarello, D P Lozano, A Bengtsson, P Scarlino, A Wallraff, D Chang, P Delsing, and S Gasparinetti. Controlling Atom-Photon Bound States in an Array of Josephson-Junction Resonators. *Physical Review X* 12, 3, 031036 (2022). [DOI](#)

10. M Kudra, M Kervinen, I Strandberg, S Ahmed, M **Scigliuzzo**, A Osman, D Pérez Lozano, G Ferrini, J Bylander, ..., and S Gasparinetti. Robust Preparation of Wigner-Negative States with Optimized SNAP-Displacement Sequences. *PRX Quantum* 3, 3, 030301 (2022). [DOI](#)

9. G Andersson, S W Jolin, M **Scigliuzzo**, R Borgani, M O Tholén, J C. Rivera Hernández, V Shumeiko, D B Haviland, and P Delsing. Squeezing and Multimode Entanglement of Surface Acoustic Wave Phonons. *PRX Quantum* 3, 1, 010312 (2022). [DOI](#)

8. Y Lu, A Bengtsson, J J Burnett, B Suri, S R Sathyamoorthy, H Renberg Nilsson, M **Scigliuzzo**, J Bylander, G Johansson, and P Delsing. Quantum Efficiency, Purity and Stability of a Tunable, Narrowband Microwave Single-Photon Source. *Npj Quantum Information* 7, 1, 1–8 (2021). [DOI](#)

7. G Andersson, A L O Bilobran, M **Scigliuzzo**, M M de Lima, J H Cole, and P Delsing. Acoustic Spectral Hole-Burning in a Two-Level System Ensemble. *Npj Quantum Information* 7, 1, 1–5 (2021). [DOI](#)

6. A Osman, J Simon, A Bengtsson, S Kosen, P Krantz, D P Lozano, M **Scigliuzzo**, P Delsing, J Bylander, and A Fadavi Roudsari. Simplified Josephson-Junction Fabrication Process for Reproducibly High-Performance Superconducting Qubits. *Applied Physics Letters* 118, 6, 064002 (2021). [DOI](#)

5. M **Scigliuzzo**, A Bengtsson, J Besse, A Wallraff, P Delsing, and S Gasparinetti. Primary Thermometry of Propagating Microwaves in the Quantum Regime. *Physical Review X* 10, 4, 041054 (2020). [DOI](#)

4. M **Scigliuzzo**, L E Bruhat, A Bengtsson, J J Burnett, A Fadavi Roudsari, and P Delsing. Phononic Loss in Superconducting Resonators on Piezoelectric Substrates. *New Journal of Physics* 22, 5, 053027 (2020). [DOI](#)

3. J J Burnett, A Bengtsson, M **Scigliuzzo**, D Niepce, M Kudra, P Delsing, and J Bylander. Decoherence Benchmarking of Superconducting Qubits. *Npj Quantum Information* 5, 1, 1–8 (2019). [DOI](#)

Unisalento affiliation (Master student)

2. C Maruccio, M **Scigliuzzo**, S Rizzato, P Scarlino, G Quaranta, M S Chiriaco, A G Monteduro, and G Maruccio. Frequency and Time Domain Analysis of Surface Acoustic Wave Propagation on a Piezoelectric Gallium Arsenide Substrate: A Computational Insight. *Journal of Intelligent Material Systems and Structures* 30, 6, 801–12 (2019). [DOI](#)

1. S Rizzato, M **Scigliuzzo**, M S Chiriaco, P Scarlino, A G Monteduro, C Maruccio, Tasco, and G Maruccio. Excitation and Time Resolved Spectroscopy of SAW Harmonics up to GHz Regime in Photolithographed GaAs Devices. *Journal of Micromechanics and Microengineering* 27, 12, 125002 (2017). [DOI](#)

6 Patents

1. INTERNATIONAL PATENT APPLICATION n° PCT/IB2026/052469

Title: Microwave waveguide device

Date: 13th March 2026

Inventors: E. Guzvovskii (10%) / T. Kippenberg (30%) / H. Li (30%) / M. Scigliuzzo (30%)

2. INTERNATIONAL PATENT APPLICATION n° PCT/IB2026/054699

Title: Wafer or substrate comprising a phononic shield, and fabrication method thereof

Date: 12th May 2026

Inventors: G. Arregui Bravo (10%) / T. Kippenberg (30%) / S. Kono (30%) / M. Scigliuzzo (30%)

3. EP26164628.5, Josephson traveling wave parametric amplifier and fabrication method thereof

OSEPHSON TRAVELLING WAVE PARAMETRIC AMPLIFIER AND FABRICATION

Inventors: E. Guzvovskii (20%) / T. Kippenberg (20%) / H. Li (40%) / M. Scigliuzzo (20%)

7 Research funding and grants

NSERC Discovery grant: Main applicant: M Scigliuzzo. I wrote and justified the grant request incorporating new material for superconducting quantum circuit. **Funded for 5 years (41k CAD/year)**

EPFL QSE Innovation Seed Grants Call 2025: Phononically shielded substrate for quantum devices. Main applicant: M Scigliuzzo. I wrote and justified the grant request incorporating phononic crystals at the qubit frequency. **Funded for 6 month (25k CHF)**

Innosuisse Switzerland-Korea Call 2024: Quantum limited amplifiers with engineered pump. Applicant/Project manager: M Scigliuzzo. I contributed to write and justified the grant request for

studying new pumping scheme in traveling wave parametric amplifiers. **Funded for 3 years (Total all partners: 1.85M CHF, EPFL allocation 620k CHF).** (see confirmation letter in the attachments)

Quantum center EPLF postdoctoral fellowship: *Exotic quantum states in circuit optomechanics.* **Main applicant: M Scigliuzzo.** I wrote and justified the grant request studying non-classical state generation on optomechanical system. **Funded for 2 years (200k CHF).** (see confirmation letter in the attachments)

EPFL Equipment: *Superconducting qubit and optomechanics control and readout system.* Main applicant: prof. Kippenberg, **Support: M Scigliuzzo.** I wrote and justified the grant request for acquiring a fast time-domain setup for qubit and optomechanics measurements. I determined the technical specifications of the equipment, carried on the acceptance. **Funded 130.4k CHF.**

EPFL Equipment: *Sputtering deposition system for superconducting films and controllable oxidation.* Main applicant: prof. Kippenberg **Support: M Scigliuzzo.** I contributed to write the grant request. I wrote the tender technical specification, and I was responsible for technical inquiries during the tender. **Funded 600k CHF.**

SNF 'REQUIP *Fast turn-around dilution refrigerator for superconducting quantum circuit prototyping.* SNF Equipment Funding. Main applicant: prof. Kippenberg **Support: M Scigliuzzo.** I wrote and justified the grant request for acquiring a dilution refrigerator with short (<12h) cooldown and warm-up times. I determined the technical specifications of the equipment, and I was the responsible for technical inquiries during the tender. **Funded 382k CHF**

8 Research supervision and leadership experience

During my PhD and my postdoc I had experience in **supervising master students:**

- Aprameyan Desikan, *Development of precise control of flip chip process for superconducting circuits.* EPFL (2024-2025).
- Constantin Mario Wehrbach, *Matrix-Product-State Simulation and Design of a Josephson Traveling-Wave Photon Detector.* EPFL (2023-2024).
- Hugo Arbez, *Time domain optomechanics with Quantum Machines.* EPFL (2022-2023).
- Kowshik E. Patel, *Engineering decay rates of Hybridised modes in Superconducting circuits.* Chalmers University (2019–2020).
- Vukan Levajac, *Measuring Coherence of a Coaxmon.* Chalmers University (2017–2018)

And **PhD students:**

- Jiaheng Wang. Circuit optomechanics. EPFL (2023–Now).
- Xuxin Wang. Superconducting qubit on Sapphire (2024–Now)
- Mahdi Chegnizadeh. Circuit optomechanics. EPFL (2021–Now).
- Evgenii Guzovskii. HBAR coupled to superconducting qubits. EPFL (2021–Now).
- Hao Li. Traveling wave parametric amplifiers. EPFL (2021–Now).
- Amir Youssefi. Circuit optomechanics. EPFL (2021–2024).

List of teaching

During the course of more than seven years I acquired a large set of skills as teaching assistant and supervisors of students. I taught in a **total of ten courses** on all levels, in particular two for **bachelor level:**

- *Physics and chemistry for civil engineers (BOM 221).* Chalmers Bachelor Program, for academic year 2017 – 2018 and 2018 – 2019. In person lecture of elementary thermodynamic exercises.

Seven courses on **master level:**

- *Superconductivity and Low Temperature Physics (FMI036).* Chalmers Master Program, for academic


year 2016 – 2017, 2017 – 2018 and 2018 – 2019. Exercises correction and in person High-Tc SQUID laboratory session.

- *Quantum Optics and Quantum Informatics* (FKA173). Chalmers Master Program, for academic year 2017 – 2018, 2018 – 2019. And 2020 – 2020. In person lecture on quantum optics exercises, in person laboratory on qubit characterization, and hand-in correction.
- *Modeling and fabrication of micro/nanodevices* (MCC115). Chalmers Master Program, for academic year 2017 – 2018. In person supervision of nanofabrication project in the cleanroom.

And one course on **PhD level**:

- *Hands-on Quantum Technology*. WACQT PhD Program, for academic year 2020– 2021. In person exercise and laboratory on qubit characterization.

Selected talks


16. Quantum Hackathon 2026 (invited) -Quantum Optics with Superconducting Circuits: from LC resonators to qubit readout. (Switzerland 2026)

15. Junior Quantum Seminar (invited) -Quantum acoustics with superconducting circuits. (Switzerland 2025)

14. APS March Meeting -Towards higher qubit-phonon coupling in a flip-chip architecture transmon-HBAR system. (USA 2025)


13. APS March Meeting -Quantum collective motion of macroscopic mechanical oscillators. (USA 2025)



12. Research seminar at Syracuse University (invited) - Exotic Multimode Quantum Systems: Interactions of Light, Sound, and Matter. (USA 2025)


11. Micromechanics Conference (invited*)  - Ultra coherent circuit optomechanics: From watching decoherence of a squeezed mechanical oscillator to collective ground state cooling. (Austria 2025)


10. Research seminar at QuTech (invited) - Exotic Multimode Quantum Systems: Interactions of Light, Sound, and Matter. (Netherland 2025)


9. Research Seminar at Institute Quantique (invited) - Exotic Multimode Quantum Systems: Interactions of Light, Sound, and Matter. (Canada 2025)


8. 2nd International Workshop on Quantum Optics with Giant Atomic Emitters (Invited*)  – Compact high impedance cavity array collectively coupled to qubit. (Sweden 2024)

7. Collective phenomena workshop (invited)  - Ground State Cooling and Emission Enhancement in Collective Mechanical Modes. (Germany 2024)  (video available at <https://youtu.be/O4jVBfz6w2s?si=TVG2G6YBv-3oZDRC>)



6. QSE Center General Assembly (invited)  - Exotic mechanical states in circuits optomechanics. (Switzerland 2024)

5. APS March Meeting  - Progress towards a near quantum-limited Josephson travelling wave parametric amplifier based on Nb-Al/Al₂O₃-Nb trilayer technology. (USA 2023) (video available at <https://www.youtube.com/watch?v=i6MOBezLl6k>)

4. APS March Meeting  - Collective dynamics in circuit optomechanical systems. (USA 2023), (video available at <https://www.youtube.com/watch?v=9sjCnvt6Np>)

3. **APS March Meeting**  - Probing nonlinear photon scattering with artificial atoms coupled to a slow-light waveguide. (Virtual 2021)

2. **WACQT e-meeting (invited)** - Scalable quantum simulation architecture based on atom-photon bound states in an array of high-impedance resonators. (Virtual 2021)

1. **APS March Meeting**  - Phononic Losses in Superconducting Coplanar Waveguide Resonators on Piezoelectric Substrates. (USA 2019). 

*On these occasions, I replaced the originally invited collaborators

Services

Press Release – The most important publication and Grant awards were covered in press release:

6. Making quantum vibration nonlinear to enable phonon-phonon interaction (2026). Related to [22]

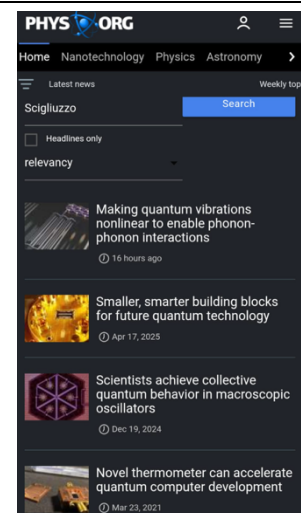
5. **Smaller, smarter building blocks for future quantum technology** (2025). Related to [19]

4. **Macroscopic oscillators move as one at the quantum level** (2025). Related to [17]

3. **EPFL, Zurich Instr, WithWave, SKKU partner for new quantum amplifiers** (2024).

2. **Unprecedented control over captured light** (2022). Related to [10]

1. **Novel thermometer can accelerate quantum computer development** (2021). Related to [4]



Service activity - I am actively involved in community service activity, both as reviewer and for outreach purposes (in parenthesis the number of occurrences).

- *Reviewer* for Nature Physics (1), PRX (1), Nature Communication (3), PRX Quantum (4), PR Letter (2), PR applied (1), Communication Physics (2), Scientific Report (1).
- *Consultant* for issue of “Superconductor Week” (1).
- *Quantum Scientist To-Go!* Organized by American Physical Society (APS) (1).
- *Outreach event at EPFL* (3rd year Bachelor students) (2).

References

For additional references, please contact my current and former supervisors:

- Prof. **Tobias J Kippenberg**, EPFL, tobias.kippenberg@epfl.ch
- Prof. **Per Delsing**, Chalmers, per.delsing@chalmers.se
- Prof. Giuseppe Maruccio, Unisalento, giuseppe.maruccio@unisalento.it

Or former and current collaborators:

- Prof. **Pasquale Scarlino**, EPFL, pasquale.scarlino@epfl.ch
- Prof. **Vincenzo Savona**, EPFL, vincenzo.savona@epfl.ch
- Prof. Simone Gasparinetti, Chalmers, simoneg@chalmers.se
- Prof. Luigi Martina, Unisalento, Luigi.Martina@le.infn.it