

Marios Kounalakis

Luxembourg Institute of Science & Technology (LIST)
Advanced Instrumentation for Nano-Analytics (AINA)
✉ marios.kounalakis@list.lu
📄 ORCID 0000-0002-9145-7131
41, rue du Brill, 4422 Belvaux, Luxembourg

Professional experience

- Oct. 2023– Present **Research & Technology Associate**, LUXEMBOURG INSTITUTE OF SCIENCE & TECHNOLOGY.
Working on the development of non-linear laser diagnostics for the dynamics of nanosecond pulsed discharges in high-pressure plasma.
- Jan. 2023– Sep. 2023 **Post-doctoral researcher**, RWTH AACHEN UNIVERSITY.
Worked on developing novel schemes for quantum control of phonons, magnons and superconducting qubits in hybrid quantum systems.
- Nov. 2021– Dec. 2022 **Quantum design engineer**, QUANTWARE.
Supervisory role (part-time) at the quantum computing startup [QuantWare](#) with a focus on the theoretical analysis of superconducting quantum circuits.
- Nov. 2019– Dec. 2022 **Post-doctoral researcher**, TU DELFT, Kavli Institute of Nanoscience.
Worked on the theoretical analysis of hybrid quantum systems comprising superconducting qubits and magnonic/mechanical resonators, focusing on devising novel circuits and schemes for controlling magnons/phonons at the quantum level. In addition, I worked on the theoretical analysis and numerical modeling of superconducting Transition-Edge Sensors for the European Space Agency as part of the ATHENA mission.

Education

- 2015–2019 **PhD in Physics**, TU DELFT, Kavli Institute of Nanoscience.
Thesis title *Nonlinear couplings for quantum control of superconducting qubits and electrical/mechanical resonators* [[link](#)]
Advisor Prof. Gary A. Steele
- 2013–2015 **MSc in Physics (cum laude)**, LEIDEN UNIVERSITY, 'Casimir pre-PhD' track.
Thesis title *Modeling digital quantum simulation of the Rabi model in circuit QED* [[link](#)]
Advisors Dr. Nathan K. Langford & Prof. Leonardo DiCarlo
- 2012–2013 **Master 2 Recherche**, PARIS DIDEROT UNIVERSITY - PARIS 7, 'Nuclei Particles Astroparticles & Cosmology', Specialization in Particle Physics.
Thesis title *Phenomenological aspects of quarkonium production at the LHC*
Advisor Dr. Jean-Philippe Lansberg
- 2007–2012 **Ptychion (4-yr BSc) in Physics**, UNIVERSITY OF ATHENS.
Thesis title *Study of Quantum Mechanics and Quantum Field Theory under the path integral formalism*
Advisor Prof. Alexandros Karanikas

Awards & Scholarships

- 2015–2019 **Casimir PhD position**, Fully funded 4-year PhD position awarded for the best PhD proposals among Leiden-Delft MSc students of the 'Casimir pre-PhD' track.
- 2014–2015 **Gorter scholarship**, Scholarship awarded by the Leiden Institute of Physics during my MSc studies.

Skills

- Theoretical- Numerical Theoretical analysis and modeling of superconducting (hybrid) quantum circuits. Numerical modeling of stochastic processes and open quantum systems.
- Experimental Microwave experiments with superconducting quantum circuits. Working with cryogenics and operating dilution refrigerators. Aligning optical systems. Operating high-power lasers. Implementing four-wave mixing techniques.
- Cleanroom Design and fabrication of superconducting qubit devices: Wet-bench processing, E-beam lithography, Reactive ion etching, E-beam evaporation, Scanning electron microscopy
- Programming Python, Matlab, Mathematica
- EM & design Ansys Maxwell, Sonnet, gdsCAD, KLayout, Autodesk Inventor

Peer-reviewed publications

- Sep. 2024 **Engineering entangled coherent states of magnons and phonons via a transmon qubit**, M. Dols, S. Sharma, L. Bechara, Y. M. Blanter, M. Kounalakis, S. Viola Kusminskiy.
[Physical Review B **110**, 104416 \(2024\)](#)
- Dec. 2023 **Engineering entangled coherent states of magnons and phonons via a transmon qubit**, M. Kounalakis, S. Viola Kusminskiy, Y. M. Blanter.
[Physical Review B **108**, 224416 \(2023\)](#)
- Aug. 2023 **Weak-link physics in the dynamical response of transition-edge sensors**, M. Kounalakis, L. Gottardi, M. de Wit, Y. M. Blanter.
[Physical Review Applied **20**, 024017 \(2023\)](#)
- Mar. 2022 **Analog quantum control of magnonic cat states on a chip by a superconducting qubit**, M. Kounalakis, G.E.W. Bauer, Y.M. Blanter.
[Physical Review Letters **129**, 037205 \(2022\)](#)
- Jul. 2020 **Flux-mediated optomechanics with a transmon qubit in the single-photon ultrastrong-coupling regime**, M. Kounalakis, Y.M. Blanter, G.A. Steele.
[Physical Review Research **2**, 023335 \(2020\)](#)
- Nov. 2019 **Synthesizing multi-phonon quantum superposition states using flux-mediated three-body interactions with superconducting qubits**, M. Kounalakis, Y.M. Blanter, G.A. Steele.
[npj Quantum Information **5**, 100 \(2019\)](#)

- Jan. 2019 **Observation and stabilization of photonic Fock states in a hot radio-frequency resonator**, M.F. Gely, M. Kounalakis, C. Dickel, J. Dalle, R. Vatré, B. Baker, M.D. Jenkins, G.A. Steele.
[Science](#) **363**, 1072 (2019)
- Aug. 2018 **Tuneable hopping and nonlinear cross-Kerr interactions in a high-coherence superconducting circuit**, M. Kounalakis, C. Dickel, A. Bruno, N.K. Langford, G.A. Steele.
[npj Quantum Information](#) **4**, 38 (2018)
- Nov. 2017 **Experimentally simulating the dynamics of quantum light and matter at ultrastrong coupling**, N.K. Langford, R. Sagastizabal, M. Kounalakis, C. Dickel, A. Bruno, F. Luthi, D. J. Thoen, A. Endo, L. DiCarlo.
[Nature Communications](#) **8**, 1715 (2017)

Conference presentations

- Apr. 2023 **Dutch Physics Society Meeting (NWO Physics)**, Veldhoven, The Netherlands.
Contributed talk
- Mar. 2023 **57th RENCONTRES DE MORIOND, Quantum Mesoscopic Physics**, La Thuile, Aosta Valley, Italy.
Contributed talk
- Dec. 2022 **SPIN CAVITRONICS IV**, Max Planck Institute for the Science of Light, Erlangen, Germany.
Invited talk
- Nov. 2022 **International Workshop on Spintronics (Spin Argentina 2022)**, San Carlos de Bariloche, Río Negro, Argentina.
Contributed talk
- Nov. 2022 **67th Annual Conference on Magnetism and Magnetic Materials (MMM 2022)**, Minneapolis, Minnesota, US.
Contributed talk
- Oct. 2022 **Spintronics/Nanomagnetism in the Netherlands**, Utrecht, The Netherlands.
Invited talk
- Mar. 2020 **Colloquium: “Nonlinear couplings for quantum control of superconducting qubits photons and phonons”**, *Department of Physics, University of Crete, Heraklion, Greece.*
Invited talk
- May 2019 **20th Anniversary of Superconducting Qubits**, Tsukuba, Japan.
Poster contribution
- Jan. 2019 **Dutch Physics Society Meeting (NWO Physics)**, Veldhoven, The Netherlands.
Contributed talk
- Nov. 2018 **International Conference on Quantum Computing (ICOQC 2018)**, Paris, France.
Contributed talk
- Apr. 2018 **Casimir Spring School**, Heeg, The Netherlands.
Contributed talk

- Mar. 2017 **APS March Meeting**, New Orleans, Louisiana, US.
Contributed talk
- Jun. 2016 **Workshop 'Quantum simulations and many-body physics with light'**, Kolymvari, Greece.
Poster contribution
- Oct. 2015 **Kavli - MPQ Workshop**, Delft, The Netherlands.
Poster contribution
- Feb. 2015 **Workshop 'Quantum Simulations'**, Benasque, Spain.
Poster contribution

Teaching experience

- 2023 **Quantum Mechanics**, BSc level - RWTH Aachen University
- 2018 & 2019 **Quantum III**, BSc level - TU Delft
- 2016 **Fundamentals of Quantum Information**, MSc level - Qutech, TU Delft

Student supervision

- 2023 - 2024 Martijn Dols (MSc project, RWTH Aachen)
- 2023 Lenos Bechara (BSc project, RWTH Aachen)
- 2022-2023 Anne Savenije (MSc project, TU Delft)
- 2019 Damian Bouwmeester (Short Casimir MSc project, TU Delft)
- 2018 -2019 Tim van de Veen (MSc project, TU Delft)
- 2018 Naïmo Davier (M1 internship, ENS Lyon - TU Delft)

Community service

- Workshop organization **Casimir Spring School**, *April 2018*.
Co-organized the seventh edition of the Casimir Spring School held in Heeg, the Netherlands.
- Peer review **Reviewer for Physical Review Letters, Nature Physics, Nature Communications, Communications Physics, Scientific reports, Physical Review B**.

Extracurricular activities

- 2016-2018 **Casimir PhD platform**.
Member of the platform representing all PhD students within the Casimir Research School at Leiden University and TU Delft.
- Jun.-Sep. 2008-2012 **Cinema technician - Film projectionist**, MUNICIPAL CINEMA OF HERAKLION, Greece.

Languages

- Greek Native speaker
- English Level C2
- French Level C1