

# Maxwell Drimmer - Postdoctoral Researcher

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## Personal Profile

Ph.D. in physics with a strong experimental background in quantum mechanics. Experienced in optics, acoustics, microwave electronics and nanofabrication, with scientific interests including optomechanics, solid-state quantum technologies, nanophotonics and materials science. A determined, self-driven researcher capable of taking responsibility for projects, leading and collaborating within a team and clearly communicating scientific objectives in a competitive environment.

## Experience

- 2026 - **Postdoctoral Researcher**  
Vučković Lab, Stanford University  
Focus: Enabling **quantum networking** of tin-vacancy defects in diamond nanophotonic cavities using **strain tuning**.
- 2020 - **Doctoral Researcher**  
2025  
Chu Lab, ETH Zürich  
Focus: achieving quantum-efficient **microwave-to-optical transduction** between a superconducting transmon qubit and a telecom-frequency photon using a Bulk Acoustic Wave (BAW)-based transducer.
- Built a **Brillouin spectroscopy experiment** in a liquid helium cryostat to characterize the optomechanical properties of several materials. Decided to work with Z-cut Quartz as a result of this investigation.
  - Improved the fabrication of **BAW resonators**, making a key advance necessary for our recent demonstration of a mechanical qubit [1]. **Developed fabrication processes with a variety of materials** including AlN-on-Quartz for use in transduction experiments.
  - Engineered **superconducting circuits** to be compatible with our optomechanical experiment. Identified suitable materials and investigated **cryogenic dielectric loss** [2]. Studied the effect of **infrared radiation on superconducting circuits**, providing insights into their quasiparticle recovery dynamics [3].
  - Pioneered **simulation techniques** for optimizing electromechanical coupling and minimizing phononic and dielectric losses [4, 5].
- 2019 - **Masters Researcher**  
2020  
Gröblacher Lab, TU Delft
- Developed a **pick-and-place technique** called "slapping": a method for transferring nanostructures between substrates using a tapered fiber to create hybrid quantum devices.
  - Integrated **silicon photonic crystal cavities** with **electromechanical resonators made from thin-film lithium niobate**, combining high optomechanical cooperativity with strong piezoelectric coupling.
  - **Designed, fabricated and measured** devices demonstrating a transduction efficiency within an order of magnitude of the state-of-the-art at the time [6].

## Education

- 2020-2025 **Eidgenössische Technische Hochschule Zürich (ETH Zürich) - Doctor of Philosophy, Physics**  
Thesis: Bulk Acoustic Quantum Transduction (Defended November 27, 2025)  
Advisor: Prof. Yiwen Chu
- 2018-2020 **Technische Universiteit Delft (TU Delft) - Master of Science, Applied Physics**  
Thesis: *Slap!* Developing Hybrid Acousto-Optic Systems for Wavelength Conversion  
Advisor: Prof. Simon Gröblacher
- 2014-2018 **Stanford University - Bachelor of Science, Physics**  
Thesis: *Building a Nanophone*: Detecting Surface Acoustic Waves with an Optomechanical Cavity  
Advisor: Prof. Amir Safavi-Naeini

# Technical Skills

## Optical and Microwave Experiments

- Conducting measurements of **optical and nanophotonic devices** with telecom-band (1550 nm) fiber and free-space optical components such as lasers, optical amplifiers, modulators, filters, network analyzers and detectors.
- Characterizing **superconducting circuits** using microwave components such as waveform generators, mixers, amplifiers, spectrum analyzers and oscilloscopes.

## Nanofabrication

- Working with nanofabrication techniques including electron beam and photo- **lithography**, wet and dry **etching**, **evaporation** and **heteroepitaxial sputtering** of superconducting and piezoelectric films.
- Creating recipes for **many different material platforms** including films of aluminum nitride, lithium niobate, niobium and niobium nitride on sapphire, quartz and silicon substrates.

## Programming and Simulations

- Using **Python** and **Mathematica** to develop numerical simulations and analyze data.
- Using **COMSOL** and **Ansys HFSS** to design nanophotonic, nanomechanical and superconducting circuit devices.

## Miscellaneous Engineering Skills

- Setting up and operating cryogenic systems including a **dilution refrigerator** and a **liquid helium cryostat**.
- Building **analog electronics**, making circuits for **control (e.g. PID) loops**
- **Designing PCBs** for microwave packaging and simple circuits such as optical switches and photodiodes.
- Drafting parts in **SOLIDWORKS** and **worked in a machine shop** to build them.

# Awards, Additional Activities and Languages

## Awards

- 2022 WOMBAT (Workshop on Optomechanics and Brillouin-Mandelstam scattering: Fundamentals, Applications and Technology) poster prize winner
- 2019 Casimir Research School Pre-PhD Honors Student and 2018 QuTech Academy Scholar at TU Delft

## Additional Activities

- 2020-25: Supervised nine student projects, including five masters theses
- 2020-25: Seven semesters as a teaching assistant in the following undergraduate courses: Quantum Electronics (lasers, optics and photonics), Physics II (quantum mechanics) and Physikpraktikum 1 & 2 (practical experiments)
- 2024-25: Mentor in the Women in Natural Sciences Mentoring Project
- 2021: Organizer of the Quantum Computing Hard- and Software Summer School
- 2017-18: Vice President of the Stanford Physics Society, Undergraduate Chapter

## Language Proficiency

- Max is a native English speaker who speaks German at a high-intermediate (B2) level.

# Publications

1. Yang, Y.\*, Kladarić, I.\*, **Drimmer, M.**, von Lüpke, U., Lenterman, D., Bus, J., & Chu, Y. (2024). *A mechanical qubit*. Science, 386, 783-788.
2. **Drimmer, M.\***, Telkamp, S.\*, Fischer, F.\*, Rodrigues, I.C., Todt, C., Krizek, F., Kriegner, D., Müller, C., Wegscheider, W., & Chu, Y. (2025). *The effect of niobium thin film structure on losses in superconducting circuits*. Mater. Quantum. Technol. 5 041001
3. Benevides, R.\*, **Drimmer, M.\***, Bisson, G., Adinolfi, F., von Lüpke, U., Doeleman, H.M., Catelani, G., & Chu, Y. (2024). *Quasiparticle dynamics in a superconducting qubit irradiated by a localized infrared source* Phys. Rev. Lett., 133, 060602.
4. Banderier, H., **Drimmer, M.**, & Chu, Y. (2023). *Unified simulation methods for quantum acoustic devices*. Phys. Rev. Applied, 20, 024024.
5. Kitzman, J.M., Lane, J.R., Unterschute, C., **Drimmer, M.**, Schleusner, A.J., Beysengulov, N.R., Mikolas, C.A., & Pol-lanen, J. (2023). *Free-space coupling and characterization of transverse bulk phonon modes in lithium niobate in a quantum acoustic device*. Appl. Phys. Lett., 123, 224001.
6. Marinković, I.\*, **Drimmer, M.\***, Hensen, B., & Gröblacher, S. (2021). *Hybrid integration of silicon photonic devices on lithium niobate for optomechanical wavelength conversion*. Nano letters, 21(1), 529-535.

# References

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**Name** Prof. Simon Gröblacher  
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