

Hamid Haghmoradi

C u r r i c u l u m V i t a e

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Vienna, Austria

LinkedIn:



Doctoral Researcher in Quantum Force Metrology

VCQ Fellow

EDUCATION

- Ph.D. in Physics**, TU Wien, Atominstitut, Austria *May 2023 – Present*
Specialization: Casimir force metrology, quantum vacuum interactions, quantum gravity
- M.Sc. in Photonics**, Shahid Beheshti University, Tehran, Iran *Aug 2017 – Feb 2020*
Thesis: Design and fabrication of a high-power continuous green fiber laser via SHG in bow-tie cavity
- B.Sc. in Solid-State Physics**, University of Kurdistan, Iran *Aug 2012 – Aug 2017*
Project: Quantum Mechanics in Biology

RESEARCH EXPERIENCE

- Doctoral Researcher, TU Wien (CANNEX Project)** *2023–Present*
- Developed Casimir metrology setup, seismic isolation with GAS filters & pendulum
 - Sub-nanometer resolution readout using Fabry–Pérot interferometry
 - Integrated KPFM and UV/Ar⁺ cleaning system
- M.Sc. Research, LAPRI, SBU Tehran** *2017–2020*
- Built tunable 1064 nm fiber laser and its SHG output
 - Designed Yb fiber and CNC laser systems

WORK EXPERIENCE

- Project Assistant**, FWF, TU Wien *May 2023 – Present*
Responsibilities: Design and fabrication of a state of art Casimir and non Newtonian experimental setup
- Technical Manager**, Optic Pardaz Co., Tehran *Apr 2022 – Dec 2022*
Responsibilities: Technical and qualitative review of foreign orders for optical and laser systems used in clinics and research centers
- Research Assistant**, Masih Daneshvari Hospital & SBU Medical Sciences *Feb 2020 – Jan 2023*
Responsibilities: Simulation and optimization of tumor treating fields (TTF) for brain and lung cancer using dielectric modeling and 3D MRI segmentation
- Researcher**, Laser & Plasma Research Institute, SBU *2017 – 2020*
Worked on Yb-doped and Nd:YAG laser system development, nonlinear optics, and cavity design

COURSES & CERTIFICATIONS

- COMSOL Workshop, TU Wien *2025*
- Quantum Machine Learning Workshop – University of Vienna *2025*

VCQ Summer School – Vienna Center for Quantum Science and Technology	2024
Visit to NIKHEF (Amsterdam): Training on seismic attenuation systems	2024
Quantum Optics I & II – Prof. Alain Aspect, École Polytechnique de Paris	2023
Quantum Theory of Light – Prof. Ebrahim Karimi, University of Ottawa	2022
Cavity Quantum Optomechanics – EPFLx Quantum Team	2022
The Brain and Space – Prof. Jennifer Groh, Duke University	2022

COURSEWORK IN FUNDAMENTAL PHYSICS

Testing Gravity in Experiments: From Classical to Quantum – University of Vienna, Prof. Markus Aspelmeyer – Grade: 1 (Excellent)

Laboratory: Quantum Optics – University of Vienna, VCQ – Grade: 1 (Excellent)

Gravitation and Cosmology I – TU Wien, Winter 2024 (Enrolled)

Gravitation and Cosmology II – TU Wien, Summer 2025 (Enrolled)

RESEARCH EXPERIENCE

Doctoral Researcher, TU Wien, CANNEX Project 2023–Present

- Co-developed the final Casimir force metrology setup using a plane-parallel plate geometry
- Designed and implemented six-axis seismic isolation with GAS filters and inverted pendulum
- Created active thermal shielding with radiative blackbody control and Peltier regulation (<0.3 mK)
- Developed and aligned Fabry–Pérot interferometer system for sub-nanometer resolution readout
- Integrated Kelvin Probe Force Microscopy (KPFM) for patch potential mapping and charge sensing
- Designed the Ar⁺ ion and UV surface cleaning chamber for precision-grade conductive plates
- Explored nonreciprocal and fluctuation-induced optomechanical forces in vacuum gaps

Supervisory Role

Mentored bachelor's and master's students on vacuum chamber instrumentation, experimental alignment, DAQ systems, and data analysis at TU Wien

Previous Research Projects

- Tunable 1064 nm fiber laser and 532 nm SHG system for spectroscopy 2019–2020
 - Design of Yb fiber lasers with optimized mode profile and high slope efficiency 2018–2020
 - Kilowatt-class laser systems and optical mode control for CNC and Q-switch cavities 2018–2029
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LAB SKILLS & TECHNICAL EXPERTISE

- Plane-parallel Casimir alignment, high-stability suspension, gap control
- Thermal control system (<1 mK) using active and passive shielding
- Fabry–Pérot interferometry for sub-nm displacement detection
- UV/Ar⁺ ion plasma cleaning, KPFM integration and patch potential reduction

- Seismic isolation: GAS filters, inverted pendulum, resonance tuning
 - DAQ: PyVISA, piezo slip-stick actuation, lock-in measurement systems
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SOFTWARE & MODELING

- Simulation: COMSOL Multiphysics, Lumerical FDTD, Zemax Optics Studio
 - Mechanicals design: Inventor, SolidWorks, Netfabb, 3-Matic, Mimics
 - Python, C, C++, MATLAB, Mathematica
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PUBLICATIONS

Haghmoradi, H., et al. (2024). *Force Metrology with Plane Parallel Plates: Final Design Review and Outlook*. Physics (MDPI), 6(2), 690–741. DOI: 10.3390/physics6020045

Haghmoradi, H., et al. (2020). *1.8 W Green Laser at 532 nm via Passive Resonant Enhancement*. IJOP 14(1). DOI: 10.29252/ijop.14.1.67

Haghmoradi, H., et al. (2020). *Tunable 1064/532 nm Fiber Laser for Spectroscopy*. ICOP & ICPET Conference

CONFERENCES & WORKSHOPS

Speaker – ICOP & ICPET 2020, Kharazmi University

Participant – VCQ Summer School 2024, Vienna

Participant – Quantum Machine Learning Workshop 2025, University of Vienna

Participant – COMSOL Workshop 2025, TU Wien

AFFILIATIONS

Vienna Center for Quantum Science and Technology (VCQ)

Optics and Photonics Society of Iran

Physics Society of Iran

REFERENCES

Prof. Markus Huber — TU Wien, Atominstitut — markus.huber@tuwien.ac.at

Prof. Hartmut Abele — TU Wien, Atominstitut — abele@ati.ac.at