Michael Werner

Curriculum Vitae

Nationality, *German*.
Marital Status, *Single*.
07.12.1994 **Born**, *Bückeburg*, Germany.

Scholastic Education

2005–2013 **Abitur**, *Städt. Gymnasium Petershagen*, Germany, *Grade: 1.4*.

Academic Education

10.2013–10.2016 **Bachelor of Science**, *Leibniz University Hannover*, Germany, *Grade: 1.0*.
Honours Degree

10.2016–10.2019 **Master of Science**, *Leibniz University Hannover*, Germany, *Grade: 1.2*.

10.2019–10.2024 **Graduation**, *Institute for Theoretical Physics, Leibniz University Hannover*, Germany.

since 10.2024 **PostDoc**, *Institute of Quantum Optics, Leibniz University Hannover*, Germany.

Bachelor Thesis

Title *Wigner Functions For Arbitrary Operator Tuples*

Supervisor Prof. Dr. Reinhard F. Werner

Description This thesis elaborates the idea to construct Wigner functions not just for position and momentum operators, but for every possible n-tuple of hermitian operators using distribution theory.

Master Thesis

Title *One-Dimensional Field Theories Arising From Continuous Measurement*

Supervisors Prof. Dr. Reinhard F. Werner & Prof. Dr. Tobias J. Osborne

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Description This thesis uses inductive limit constructions and Stinesprings factorization theorem to build continuous dilation spaces upon quantum channels. One obtains a subtle correspondence to gauge fields and cMPS. Those one-dimensional quantum fields are then analysed to gain as much information about the underlying quantum system as possible.

PhD Thesis

Title Gravitational Curvature And Relativistic Effects In Atom Interferometers

Supervisor Prof. Dr. Klemens Hammerer

Description This work is a theoretical investigation of atom interferometers in complex gravitational fields. The underlying gravitational models include non-trivial corrections in the gravitational potential within the framework of classical Newtonian mechanics, which go beyond the assumption of an idealised or even completely homogeneous gravitational field. On the other hand, the theory of general relativity is used to enable a post-Newtonian description, particularly in the area of weak gravitational fields.

PostDoc

Group Theory of Quantum Sensing

Group Leader Dr. Naceur Gaaloul

Description Continuation on the description of atom interferometers in complex gravitational fields. Now, also including more sophisticated numerical models and a variety of experimental imperfections such as wavefront aberrations, parasitic ports and noise.

Teaching and Mentoring Experiences

Winter term 16/17 **Tutor**, *Lecture: "Theoretical Physics For Teachers"*.

Summer term 17 **Tutor**, *Seminar: "Advanced Quantum Theory"*.

Winter term 17/18 **Tutor**, *Lecture: "Theoretical Physics For Teachers"*.

Summer term 18 **Tutor**, *Lecture: "Advanced Quantum Theory"*.

Winter term 18/19 **Tutor**, *Lecture: "Theoretical Physics For Teachers"*.

Summer term 19 **Tutor**, *Lecture: "Introduction To Quantum Theory"*.

Summer term 20 **Tutor**, *Lecture: "Advanced Quantum Theory"*.

Summer term 20 **Exercise Leader**, *Repetitorium: "Classical Electrodynamics"*.

Summer term 21 **Tutor**, *Lecture: "Introduction To Quantum Theory"*.

Summer term 22 **Tutor**, *Lecture: "Quantum Physics for Nanotechnology"*.

Summer term 23 **Tutor**, *Lecture: "Quantum Physics for Nanotechnology"*.

Summer term 24 **Tutor**, *Lecture: "Quantum Physics for Nanotechnology"*.

Academic and Professional Activities

March 2016 **DPG Conference**, *Technical support*, Hannover.

November 2018 **Einstein Inside Exhibition**, Hannover.
Technical support and giving guided tours in general relativity.

Computer skills

Office	LaTeX, OpenOffice, Microsoft Office
Programming	Python, Mathematica

Languages

German	Mothertongue
English	Fluent
Spanish	Bascis
Japanese	Bascis

Conferences and Talks (Selection)

2021 **Experimental Tests and Signatures of Modified and Quantum Gravity**, *Bad Honnef, Germany (Online)*, Poster Contribution.

2022 **Frontiers of Matter Wave Optics**, *Trieste, Italy*, Poster Contribution.

2023 **TVLBAI 1st Workshop**, *CERN, Switzerland*, Poster Contribution.

2023 **Time and Clocks**, *Bad Honnef, Germany*, Poster Contribution.

2024 **TVLBAI 2nd Workshop**, *London, UK*, Poster Contribution.

2024 **Frontiers of Matter Wave Optics**, *Crete, Greece*, Poster Contribution.

2025 **Photonics West**, *San Francisco, USA*, Talk.

2025 **Stanford University**, *Stanford, USA*, Talk.

2025 **Rencontres de Moriond**, *La Thuile, Italy*, Talk.

2025 **TVLBAI 3rd Workshop**, *Hannover, Germany*, Co-Organization.

References

Prof. Dr. Klemens Hammerer
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Dr. Naceur Galooul
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Zentrum für Angewandte Raumfahrttechnologie und Mikrogravitation
Universität Bremen
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Publications

Sven Abend, Baptiste Allard, Iván Alonso, John Antoniadis, Henrique Araújo, Gianluigi Arduini, Aidan S Arnold, Tobias Asano, Nadja Augst, Leonardo Badurina, et al. Terrestrial very-long-baseline atom interferometry: Workshop summary. *AVS quantum science*, 6(2), 2024.

Michael Werner and Klemens Hammerer. Atom interferometers in weakly curved spacetimes using bragg diffraction and bloch oscillations, 2023.

Michael Werner, Philip K Schwartz, Jan-Niclas Kirsten-Siemß, Naceur Gaaloul, Domenico Giulini, and Klemens Hammerer. Atom interferometers in weakly curved spacetimes using Bragg diffraction and Bloch oscillations. *Physical Review D*, 109(2):022008, 2024.

Michael Werner and Klemens Hammerer. Local Measurement Scheme of Gravitational Curvature using Atom Interferometers [Data set], 2024.

Michael Werner, Ali Lezeik, Dennis Schlippert, Ernst Rasel, Naceur Gaaloul, and Klemens Hammerer. Local Measurement Scheme of Gravitational Curvature using Atom Interferometers, 2024.

Adam Abdalla, Mahiro Abe, Sven Abend, Mouine Abidi, Monika Aidelsburger, Ashkan Alibabaei, Baptiste Allard, John Antoniadis, Gianluigi Arduini, Nadja Augst, et al. Terrestrial very-long-baseline atom interferometry: Summary of the second workshop. *arXiv preprint arXiv:2412.14960*, 2024.

Other

Since 2022 **Co-CEO of 'MW Gesellschaft für Solar & Science mbH'**, *Private company dedicated to push renewable energies in Germany*, `www.mw-solar-science.com`.