Klaus Liegener

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Work Experience

03/2022 – today: Walther-Meißner-Institute, Germany
Scientific Manager MQV
- Coordination of efforts the Munich Quantum Valley to develop quantum computers with up to 100 qubits
- Project manager for the 44.2-mio € quantum demonstrator project MUNIQC-SC
- Leading a team of up to 3 students (PhD to master)
- Specialisation: analog quantum simulations & quantum algorithms

11/2020 – 02/2022: Technical University of Munich, Germany
Project Manager TUM Venture Labs
TUM Venture Labs are incubators for start-ups in Deep-Tech domains.
- Supervision of up to 5 people (2 working students & 3 PhD students)
- Operational ramp-up for incubators in four different tech domains (Quantum, Software/Ai, Robotics, Aerospace)
- Organisation of the "Quantum Entrepreneurship Lab" at TUM in the summer term of 2021
- Execution of overarching projects, e.g. allocating budgets and acquiring third-party funding
- Consultation of start-up teams for accessing offerings & infrastructure in the Munich ecosystem

02/2020 – 09/2020: DESY (German Electron Synchrotron), Hamburg, Germany
Postdoctoral Researcher
DESY is the biggest particle accelerator in Germany.
- Extension of PhD results to solving problems in high energy physics
- Scientific metrics: over 20 published articles with over 500 citations (h-index: 12) – vs an average of 6 articles & 120 citations for researchers of the same level in this field
- Specialisation: semiclassical systems, renormalisation

10/2018 – 01/2020: Louisiana State University, Baton Rouge, USA
Postdoctoral Researcher
LSU is a prestigious US university, e.g. renowned for discovering Gravitational Waves in 2014.
- Application of tools from my PhD to Gravitational Waves, Cosmology and semiclassical quantum theories
- Invited talks at 5 international research institutes (NORDITA, Perimeter Institute, University Regensburg, Florida Atlantic University, York University in Toronto)
- Participation and presentation of original research at 7 international conferences (between 2016 and 2020)
- Specialisation: quantum gravity, semiclassical systems

Education

07/2014 – 12/2018:	Friedrich-Alexander University, Erlangen, Germany

PhD of physics (Magna cum Laude)
- PhD thesis: Renormalisation in quantum gravity
- Supervision of two Bachelor theses in 2018, both of which were awarded with highest grade
- Organization of journal clubs and student seminars
- Tutoring for several (in total 8) lectures in the math and physics departments
- Specialisation: quantum field theory, renormalisation

10/2012 – 06/2014:	Friedrich-Alexander University, Erlangen, Germany

Master of physics (1.28)
- Specialisation: theoretical quantum physics

10/2009 – 09/2012:	Friedrich-Alexander University, Erlangen, Germany

Bachelor of physics (1.41)

Teaching Experience

04/2018 – 07/2018:	Friedrich-Alexander University

Lecture: Introduction to Loop Quantum Gravity
- Inofficial course for students of the department

04/2018 – 10/2018:	Friedrich-Alexander University

Supervision of bachelor theses
(official supervisor: Prof. Kristina Giesel)
- Ernst-Albrecht Zwicknagel: "Expectation Values of Holonomy-operators in Cosmological Coherent States for LQG"
- Stefan Weigl: "Implications from Different Regularisations for the Canonically Quantised k=+1 FLRW spacetime"

04/2013 – 10/2018:	Friedrich-Alexander University

Tutor at the Department of Physics
Subjects (one term each):
"Classical Field Theory and Electrodynamics" (2017), "Classical Mechanics" (2016), "Advanced Theoretical Physics: Advanced Quantum Mechanics" for Masters (2015), "Quantum Theory" (2015), "Quantum Mechanics" (2014), "Quantum Mechanics for elite study program" (2014), "Quantum Mechanics" (2013)

10/2009 – 03/2010:	Friedrich-Alexander University

Tutor at the Department of Mathematics
Subject: "Linear algebra and analytic geometry I"

Conferences & Talks

19/03/2023:	**APS March Meeting, Las Vegas, USA** Talk: Multi-Qubit coupler for superconducting circuits with controllable inductive interactions
13/07/2022:	**COST CA18108 Third Annual Conference, Napoli, Italy** Invited Talk: LQG and its road to phenomenology
17/06/2019:	**LOOPS 19 conference,** Pennsylvania State University, USA Talk: An Algorithm for LQG Expectation Values in Cosmology Talk: New LQC Modifications from Symplectic Structures
14/05/2019:	**International Loop Quantum Gravity Seminar** Talk: New LQC Modifications from Symplectic Structures
06/07/2018:	**15th Marcel Grossmann meeting, Rome, Italy** Talk: Discretisation Ambiguities in (Loop) Quantum Gravity
19/02/2018:	**Tux workshop on quantum gravity, Tux, Austria** Talk: Hamiltonian Renormalisation
26/09/2017:	**International Loop Quantum Gravity Seminar** Talk: Cosmological Effective Hamiltonian from full LQG
17/07/2017:	**LOOPS 17 conference, Warsaw, Poland** Talk: Cosmological Effective Hamiltonian from full LQG Dynamics
26/06/2016:	**Classical and Quantum Symmetries conference, Jena, Germany** Talk: Quantum Einstein Yang-Mills theory in Loop Quantum Gravity
29/02/2016:	**Spring conference, German Physical Society, Hamburg, Germany** Talk: Towards the Quantum Einstein Yang-Mills Spectrum

Responsibilities and Outreach

10/2018 – 01/2020:	**Organiser of group seminars** Responsibility: Planning the schedule, inviting speakers, taking care of guests at the institute
05/2017 – present:	**Frequent presenter at science slams** Popular Science talks for broad audiences (e.g. in Bielefeld, Stuttgart, San Francisco; awarded with first prize in Regensburg)
10/2014 – 07/2018:	**Organiser of student seminars at the department** Responsibility: Planning and scheduling of talks & organisation of a journal club

Awards, Grants & Memberships

05/2015 – 05/2018:	**PhD grant of the "German National Merit Foundation"**
10/2013:	**Ohm Prize for Promotion of Young Academics of the Department of Physics of FAU Erlangen** University award for one of the top bachelor theses
09/2008 – present:	**Membership of MinD e.v.** Worldwide biggest network for persons with a high IQ

Statistical Data on the Scientific Profile

Metrics:	- Scientific articles: 23 - thereof published: 23 - Citations: 411 - h-index 12 - Peer reviews: 36 (verified via publons.com)
Inspire profile:	https://inspirehep.net/authors/1275095?ui-citation-summary=true
Google scholar profile:	https://scholar.google.com/citations?user=Z9yM6UQAAAAJ&hl=en&oi=ao

Knowledge and Interests

Language skills:	German, fluent in speech and writing English, fluent in speech and writing French, basic knowledge
Technical skills:	Proficient knowledge: MS-Office, LaTeX, Mathematica Basic knowledge: Matlab, Python
Hobbies:	Theatre (actor & director at Theatre Company Siemens Erlangen)

Publication List (before 2023: Authors in alphabetical order as customary in the QFT community)

[25] 03/2023 **Parametric multi-element coupling architecture for coherent and dissipative control of superconducting qubits,** arXiv:2403.02203, G. Huber et al.

[24] 12/2023 **Efficient decoupling of a non-linear qubit mode from its environment,** arXiv:2312.16988, F. Pfeiffer et al.

[23] 12/2021 **Quantum speed limit and stability of coherent states in quantum gravity,** Class. Quant. Grav. , K. Liegener, Ł. Rudnicki

[22] 01/2021 **Towards exploring features of Hamiltonian Renormalisation relevant for quantum gravity,** Class. Quant. Grav. 39, B. Bahr, K. Liegener

[21] 12/2020 **Algorithmic approach to Cosmological Coherent State Expectation Values in LQG,** Class. Quant. Grav. 38, K. Liegener, Ł. Rudnicki

[20] 09/2020 **Symmetry restriction and its application to gravity** Class. Quant. Grav. 38, W. Kaminski, K. Liegener

[19] 03/2020 **Hamiltonian Renormalisation V: Free Vector Bosons** Front. Astron. Space Sci., 7, K. Liegener, T. Thiemann

[18] 02/2020 **Modifications to gravitational wave equation from canonical quantum gravity,** EPJC Letter, 80, 741, A. Dapor, K. Liegener

[17] 01/2020 **Effective LQC model for k=+1 isotropic cosmology from discrete spacetimes,** Phys. Rev. D, 102, K. Liegener, S. Weigl

[16] 01/2020 **Expectation values of Coherent States for SU(2) Lattice Gauge Theories** Journal of High Energy Physics, 24, K. Liegener, E. Zwicknagel

[15] 10/2019 **Challenges in recovering a consistent cosmology from the effective dynamics of loop quantum gravity**, PRD 100, A. Dapor, K. Liegener, T. Pawłowski

[14] 09/2019 **Some physical implications of regularization ambiguities in SU(2) gauge-invariant loop quantum cosmology,** Phys. Rev. D 100, K. Liegener, P. Singh

[13] 09/2019 **New Loop Quantum Cosmology Modifications from Gauge-covariant Fluxes,** Phys. Rev. D 100, K. Liegener, P. Singh

[12] 09/2019 **Perspectives on the dynamics in loop effective black hole interior,** Phys. Rev. D 101, M. Assanioussi, A. Dapor, K. Liegener

[11] 06/2019 **Emergent de Sitter epoch of the Loop Quantum Cosmos: detailed analysis,** Phys. Rev. D 100, M. Assanioussi, A. Dapor, K. Liegener, T. Pawłowski

[10] 06/2019 **Gauge invariant bounce from quantum geometry,** Class. Quant. Grav., 37, 8, K. Liegener, P. Singh

[9] 01/2018 **Emergent de Sitter Epoch of the Quantum Cosmos,** Phys. Rev. Lett. 121,8, M. Assanioussi, A. Dapor, K. Liegener, T. Pawłowski

[8] 11/2017 **Hamiltonian renormalisation IV. Renormalisation flow of D + 1 dimensional free scalar fields and rotation invariance,** Class. Quant. Grav. 35, 24, T. Lang, K. Liegener, T. Thiemann

[7] 11/2017 **Hamiltonian renormalization III. Renormalisation flow of 1 + 1 dimensional free scalar fields: properties,** Class. Quant. Grav. 35, 24, T. Lang, K. Liegener, T. Thiemann

[6] 11/2017 **Hamiltonian Renormalisation II. Renormalisation Flow of 1+1 dimensional free scalar fields: Derivation,** Class. Quant. Grav. 35, 24, T. Lang, K. Liegener, T. Thiemann

[5] 11/2017 **Hamiltonian Renormalisation I: derivation from Osterwalder–Schrader reconstruction,** Class. Quant. Grav. 35, 24, T. Lang, K. Liegener, T. Thiemann

[4] 10/2017 **Cosmological coherent state expectation values in loop quantum gravity I. Isotropic kinematics,** Class. Quant. Grav. 35, 13, A. Dapor, K. Liegener

[3]   06/2017   **Cosmological Effective Hamiltonian from full Loop Quantum Gravity Dynamics,** Phys. Lett. B785, 506, A. Dapor, K. Liegener

[2]   05/2016   **Towards the fundamental spectrum of the Quantum Yang-Mills Theory,** Phys. Rev. D94, 2, K. Liegener, T. Thiemann

[1]   06/2013   **Matrix Elements of Lorentzian Hamiltonian Constraint in LQG,** Phys. Rev D88, 084043, E. Alesci, K. Liegener, A. Zipfel