Max Joseph Fahn

08.12.1995 in Ingolstadt (Germany)

Institute for Quantum Gravity
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Theoretical physicist, with research at the intersection between Quantum Gravity, Quantum Information and Quantum Field Theory

Research interests: Gravitational Decoherence, Open Quantum Systems, (Loop) Quantum Gravity, Theoretical Astroparticle Physics, Cosmology, Neutrino Physics, Fundamental Quantum Mechanics

Education

since 04/2021 **PhD student**, *Institute for Quantum Gravity, Universität Erlangen-Nürnberg*, elite study programme "physics with integrated doctoral programme"

10/2017–11/2020 **Master**, *University of Erlangen-Nürnberg and University of Regensburg*, elite study programme "physics with integrated doctoral programme"
Grade: 1.00, with distinction

10/2014–02/2018 **Bachelor**, *University of Erlangen-Nürnberg and University of Regensburg*, elite study programme "physics with integrated doctoral programme"
Grade: 1.23

09/2006–06/2014 **High school**, *Gymnasium Schrobenhausen*
Grade: 1.0

Professional Experience

08/2022–10/2022 **Co-organisation of international conference**, *Title: Diversity in physics for the diversity of physics*, Erlangen

since 11/2020 **Scientific Employee**, *Institute for Quantum Gravity*, Erlangen

since 10/2020 **Webmaster**, *for several web pages of the university*

10/2017–07/2020 **Teaching Assistant and Tutor**, *for several courses at the physics department at FAU Erlangen-Nürnberg*

02/2013–08/2014 **Development of an application for tours in Rome**, *first as school project in a team of students, later individually and voluntarily for the diocese of Augsburg*

09/2009–06/2014 **Spokesman for my class and later for my year**, *organisation of different events for my year and the entire school*

07/2012 **Internship**, *Fraunhofer Institute for Integrated Circuits IIS*, Erlangen
Acoustic research

10/2006–07/2012 **Editor in school's newspaper**

Research Projects

since 04/2021 **PhD project**, *Institute for Quantum Gravity*, Erlangen
Title (tentative): "Gravitational decoherence in neutrino oscillations"

03/2019–10/2020 **Master's thesis**, *Institute for Quantum Gravity*, Erlangen
Title: "Gravitationally induced decoherence in open quantum systems using linearised gravity formulated in Ashtekar variables"

08/2018–12/2018 **Research project**, *Erlangen Centre for Astroparticle Physics*
Title: "Sensitivity of the ORCA neutrino detector to quantum decoherence effects"

04/2018–08/2018 **Research project**, *Institute for Quantum Gravity*, Erlangen
Title: "Eigenstates of the Lewis-Riesenfeld invariant for de Sitter and quasi-de Sitter universes"

05/2017–10/2017 **Bachelor's thesis**, *mainly carried out at the University of Regensburg*
Title: "Asymptotic analysis of many-body interference in Boson Sampling devices"

08/2016–09/2016 **Research project**, *Helmholtz Institute Erlangen-Nürnberg*
Title: "Investigating the $[Ru(CO)_3Cl_2]_2$-Decarboxylation with different exchange-correlation functionals"

Scientific Publications

04/2023 M. J. Fahn, K. Giesel, M. Kobler. A gravitationally induced decoherence model using Ashtekar variables. *Classical and Quantum Gravity* 2023, 40(9), 094002. https://arxiv.org/abs/2206.06397.

07/2019 M. J. Fahn, K. Giesel, M. Kobler. Dynamical Properties of the Mukhanov-Sasaki Hamiltonian in the Context of Adiabatic Vacua and the Lewis-Riesenfeld Invariant. *Universe* 2019, 5(7), 170. https://doi.org/10.3390/universe5070170.

Soon M. J. Fahn, K. Giesel, R. Kemper. Gravitationally induced decoherence on photons.

Soon M. J. Fahn, K. Giesel. Gravitationally induced decoherence on a scalar field: One-particle sector.

Scientific Talks

02.05.2023 **FAU Square Workshop**, *FAU Erlangen-Nürnberg*
Title: "A master equation for gravitationally induced decoherence of a scalar field using Ashtekar variables"

28.02.2023 **WE-Heraeus-Seminar "Time and Clocks"**
Poster presentation, Title: "A gravitationally induced decoherence model in the relational formalism"

19.07.2022 **LOOPS22**, *ENS de Lyon*
Title: "A master equation for gravitationally induced decoherence of a scalar field using Ashtekar variables"

24.03.2022 **DPG Spring meeting**, *Universtity of Heidelberg/Zoom*
Title: "A master equation for gravitationally induced decoherence of a scalar field"

28.01.2021 **Neutrino group meeting**, *Erlangen Centre for Astroparticle Physics*
Title: "Gravitationally induced decoherence in open quantum systems"

17.12.2020 **Study days**, *University of Regensburg*
Title: "Gravitationally induced decoherence in open quantum systems using linearised gravity formulated in Ashtekar variables"

18.11.2020 **Presentation of Master's thesis**, *Institute for Quantum Gravity*
Title: "Gravitationally induced decoherence in open quantum systems using linearised gravity formulated in Ashtekar variables"

29.11.2018 **Study days**, *University of Regensburg*
Title: "Sensitivity of the ORCA neutrino detector to quantum decoherence effects"

30.11.2017 **Study days**, *University of Regensburg*
Title: "Asymptotic analysis of many-body interference in Boson Sampling devices"

Teaching and Supervision Experience at FAU Erlangen-Nürnberg

03/2023 **Lecturer**, *Compact Course Theoretical Physics for Bachelor Students (Electrodynamics)*

01/2023–06/2023 **Co-Supervision of a project student**, *Working on Comparison of different Markovian approximations in the context of a 0D quantum mechanical toy model for gravitational decoherence*

10/2022–02/2023 **Tutor**, *Quantum Field Theory*

03/2022–04/2022 **Lecturer**, *Compact Course Theoretical Physics for Bachelor Students (Electrodynamics)*

10/2021–02/2022 **Tutor**, *Classical Field Theory (Theoretical Electrodynamics)*

09/2021–03/2023 **Co-Supervision of a master student**, *Working on Gravitationally induced decoherence of photons*

04/2021–07/2021 **Tutor**, *Theoretical Quantum Mechanics*

10/2020–02/2021 **Tutor**, *Quantum Field Theory*

04/2020–07/2020 **Teaching Assistant**, *Theoretical Quantum Mechanics (Elite study programme)*

10/2019–02/2020 **Tutor**, *Classical Field Theory (Theoretical Electrodynamics)*

04/2019–07/2019 **Tutor**, *Experimental Physics II (Thermodynamics, Electrodynamics)*

10/2018–02/2019 **Tutor**, *Experimental Physics I (Classical Mechanics)*

04/2018–08/2018 **Teaching Assistant**, *Theoretical Quantum Mechanics (Elite study programme)*

04/2018–07/2018 **Tutor**, *Experimental Physics II (Thermodynamics, Electrodynamics)*

10/2017–02/2018 **Tutor**, *Experimental Physics I (Classical Mechanics)*

Third-party Funds

10/2014–09/2020 **Max Weber-Program of the State of Bavaria**, *Scholarship program within the elite network of Bavaria for highly-gifted students*, in total 15 480 €

09/2020–07/2024 **Herinrich-Böll-Foundation**, *PhD Scholarship*, in total 51 750 €

Awards and Scholarships

10/2023 **FAU Teaching Award for Young Researchers**, *Friedrich-Alexander-Universität Erlangen-Nürnberg*

10/2023 **Renate-Wittern-Sterzel-Award for Diversity**, *Friedrich-Alexander-Universität Erlangen-Nürnberg*, for the organisation commitee of the DIPHER22 conference

05/2023 **Award for extraordinary commitment to teaching**, *Student association at the department of physics of FAU Erlangen-Nürnberg*

03/2023 **Thrid Poster Award**, *WE-Heraeus-Seminar "Time and Clocks"*

05/2022 **Ohm Award of the department of physicsat FAU**, *awarded for one of the best master's theses in the academic year 2020/2021*

since 09/2021 **Heinrich-Böll-Foundation**, *PhD Scholarship*

10/2014–09/2020 **Max Weber-Program of the State of Bavaria**, *Scholarship program within the elite network of Bavaria for highly-gifted students*

27.06.2014 **Activity price**, *awarded by the support association of the Gymnasium Schrobenhausen for various activities and voluntary engagement*

27.06.2014 **Golden Pin of Honour**, *awarded by the Bavarian association of the German classical scholar association (Deutscher Altphilologenverband) for excellent accomplishments in Latin*

2012 **Fourth price in the german president's competition for development policy for schools**, *Title: "All for one world - One world for all"*

2012 **First price within Bavaria at the German competition of foreign languages for Latin**

11/2008 and 03/2011 **Invitation to and participation at the mathematics seminar of the society for promotion of talented people in mathematics (Begabtenförderung Mathematik e.V.)**, *due to very good accomplishments in their competition*

Further Training

10/2023 **Mission Impossible? - Confident moderation of teams, creative processes and conflicts**, *Elite network of Bavaria*, (4 days)

06/2023 **Serene in stress - Strengthening your own resilience**, *Elite network of Bavaria*, (4 days)

10/2022 **Strikingly coherent! Training for a melodious and powerful voice**, *Elite network of Bavaria*, (4 days)

08/2022 **Perspectives on a technological world in transition**, *Summer Academy at the Academy for Political Education Tutzing*, (4 days)

06/2022 **Our contribution to the future**, *Elite network of Bavaria*, (4 days)

10/2021 **Presentation Skills**, *Elite network of Bavaria*, (4 days)

10/2018 **Presenting and writing about your research**, *Elite network of Bavaria*, (4 days)

Stays at other institutes

08/2019–09/2019 **Salmínter**, *Spanish language course*, (3 weeks, level C1)
Salamanca, Spain

03/2019 **Salmínter**, *Spanish language course*, (3 weeks, level B2)
Salamanca, Spain

08/2018–09/2018 **Hilderstone college**, *English language course*, (3 weeks, level C1)
Broadstairs, UK

10/2016–10/2017 **University of Regensburg**, *Exchange year*, (within the elite study programme)
Regensburg, Germany

Languages

German	Mother tongue
English	C1
Spanish	C1
French	B1
Latin	Profound knowledge (Großes Latinum)

Computer skills

Knowledge in HTML, C++ and C (also programming of micro controllers), Java (also applications for Android), Python, PHP, QT, Scala, experience as Webmaster

Leisure Activities

2022 **Singing classes**

since 2021 **Pop- and Gospel choir Erlangen**, *Member and one of the co-directors*

2010–2014 **Participation in several school choirs**

since 2004 **Participation in various orchestras and ensembles**

2002–2013 **Violin lessons**

Voluntary Activities

since 11/2022 **Member of the jury for DOPPLERS**, *Competition in Theoretical Physics*

since 08/2022 **Member of the Diversity Team at the Department of Physics at FAU**

since 04/2022 **Chairman of the regional group Erlangen-Nürnberg of the young german physical society jDPG**

2021 – 2022 **Co-organisator of PLANCKS22**, *International competition in theoretical physics*

since 05/2018 **Member of the Förderverein der Fachschaftsinitiative Mathematik/Physik Erlangen e.V.**, *non-profit association; first year as cash auditor*

since 10/2017 **Member of FSI Mathe/Physik/Data Science**, *group of students that support other students and organise events for better networking between students and university*

2013–2018 **Member in the working group of altar servers in the diocese of Augsburg**, *Organisation of events with up to several thousand people*

2011–2014 **Member in the working group for politics and contemporary history at school**

2011–2014 **Foundation and supervision of a youth group with regular meetings in my village**

2005–2012 **Altar server**, *annual participation in charity events to collect donations*