

Jan Głowacki

+48 661 117 739 | jan.glowacki@oeaw.ac.at
janglewacki.com | ORCID | Google Scholar | arXiv

Research Interests

My research sits at the interface of *quantum foundations*, *quantum information*, *mathematical physics* and *the foundations of spacetime*. I develop tools and frameworks at the intersection of quantum theory and relativity, with the broader aim of rethinking relativistic quantum physics. Particular topics of interest include:

- Operational and categorical approaches to quantum reference frames.
- Relational foundations of quantum field theory on curved and indefinite backgrounds.
- Symmetry, constraints and quantisation of generally covariant field theories.
- Diffeology, groupoids and Lie algebroids in classical and quantum geometry.
- Conceptual and philosophical aspects of emergent spacetime.

Research Positions

Institute for Quantum Optics and Quantum Information (IQOQI)

Postdoctoral Researcher

- Group of Prof. Markus P. Müller; also affiliated with the Basic Research Community for Physics (BRCP).

Vienna, Austria

Mar 2025 – present

University of Oxford

Postdoctoral Researcher

- Department of Computer Science; supervisors Prof. Aleks Kissinger and Prof. Jonathan Barrett.
- Position funded by QISS (Quantum Information Structure of Spacetime).

Oxford, UK

Feb 2024 – Jan 2025

University of Gdańsk

Postdoctoral Researcher

- International Centre for Theory of Quantum Technologies (ICTQT); supervisors Prof. Ana Belén Sainz and Dr. John Selby.
- Position funded by FoQaCiA (Foundations of Quantum Computational Advantage).

Gdańsk, Poland

Oct 2023 – Jan 2024

University of Bonn

Heinrich Hertz Fellow

- Lichtenberg Group; supervisor Prof. Dennis Lehmkuhl.
- Topic: origin of the constraints bracket of General Relativity.

Bonn, Germany

Oct 2020 – Jan 2021

Polish Academy of Sciences

CFT Scholarship

- Center for Theoretical Physics (CFT PAN).
- Topic: groupoid symmetry and quantisation of General Relativity.

Warsaw, Poland

Jan 2019 – Oct 2020

Research Visits

Okinawa Institute of Science and Technology

Visiting Researcher

- Qubits and Spacetime Unit (host: Prof. Philipp Höhn). Co-funded by OIST and QISS.

Okinawa, Japan

Oct – Nov 2024

Perimeter Institute for Theoretical Physics

Visiting Researcher

- Quantum Gravity Group (host: Prof. Laurent Freidel). Co-funded by PI and QISS.

Waterloo, Canada

Sep 2024

University of Edinburgh

Visiting Researcher

- School of Informatics (host: Prof. Chris Heunen). Funded by NAWA (Polish National Agency for Academic Exchange).

Edinburgh, UK

Aug 2022

Polish Academy of Sciences

Research Internship

- Center for Theoretical Physics (host: Prof. J. Kijowski). Topic: geometric quantisation.

Warsaw, Poland

June – July 2013

Education

Polish Academy of Sciences

PhD in Physics

- Center for Theoretical Physics (CFT PAN); supervisor Prof. M. Kuś.
- Thesis: *Operational Quantum Frames: An operational approach to Quantum Reference Frames* (arXiv:2304.07021).

Warsaw, Poland

Oct 2019 – Sep 2023

Radboud University

MSc in Mathematical Physics

- Department of Mathematics; supervisor Prof. N.P. Landsman.
- Thesis: *Groupoid symmetry and constraints of General Relativity revisited*.

Nijmegen, The Netherlands

Sep 2017 – Aug 2019

University of Warsaw

BSc in Physics

- Faculty of Physics; supervisors Prof. J. Lewandowski, Dr. A. Szereszewski.
- Thesis: *Relativistic particle in de Sitter space-time*.

Warsaw, Poland

Sep 2010 – Nov 2014

Selected Publications

2025: S. Fedida, **J. Głowacki**. *Foundations of Relational Quantum Field Theory I: Scalars*. Preprint, arXiv:2507.21601.

2025: T. Carette, **J. Głowacki**, L. Loveridge. *Operational Quantum Reference Frame Transformations*. Quantum **9**, 1680 (2025). arXiv:2303.14002.

2024: **J. Głowacki**. *Towards Relational Quantum Field Theory*. Preprint, arXiv:2405.15455.

2024: **J. Głowacki**. *Relativization is naturally functorial*. Preprint, arXiv:2403.03755.

2019: **J. Głowacki**. *Groupoid symmetry, constraints and quantisation of General Relativity*. Preprint, arXiv:1905.03152.

A complete publication list is available at janglowacki.com and on Google Scholar.

Invited Talks

Oct 2025: *Operational Quantum Frames: from quantum mechanics to quantum field theory and beyond*.

Invited talk at *Quantum Reference Frames: A QISS Workshop*, OIST, Okinawa, Japan. Video.

Collaborations

Multi-institutional collaboration

EmerGe – Emergent Geometries

2022 – present

- With G. Franzmann (Nordita), A. Di Biagio (IQOQI Vienna), E. Colafranceschi (UCSB), F. Niedermann (Nordita), J. Flikman (Stockholm) and N. Linnemann (Bremen). Investigates phenomenological signatures constraining approaches to emergent spacetime.

Organised Events

Sejny Summer Institute

Sejny, Poland

2021 – 2023

- Annual summer school for junior researchers in physics, mathematics and philosophy.

Teaching

Radboud University

Teaching Assistant, Mathematics

- Exercise classes and grading for first- and second-year undergraduates.

Nijmegen, The Netherlands

Sep 2018 – Aug 2019

Warsaw, Poland

Private Tutor

Sep 2011 – Aug 2017

- One-to-one tutorials in mathematics and physics at all pre-university and early undergraduate levels.

Languages

Polish (native) | **English** (fluent, professional working proficiency).