Curriculum Vitae

Personal Information

Name:	Tomasz Szołdra
Year of birth:	1996
E-mail:	t.szoldra@gmail.com

Interests

machine learning in quantum physics, many-body localization, quantum many-body scars, neural quantum states, ultracold atoms

Publications

- **Catching thermal avalanches in the disordered XXZ model**
  T. Szołdra, P. Sierant, M. Lewenstein, and J. Zakrzewski,
  Phys. Rev. B 109, 134202 (2024) - Editors' Suggestion
- **Femtosecond pulse parameter estimation from photoelectron momenta using machine learning**
  T. Szołdra, M. F. Ciappina, N. Werby, P. H. Bucksbaum, M. Lewenstein, J. Zakrzewski, A. M. Maxwell, New J. Phys. 25, 083039 (2023)
- **Tracking locality in the time evolution of disordered systems**
  T. Szołdra, P. Sierant, M. Lewenstein, J. Zakrzewski,
  Phys. Rev. B 107, 054204 (2023)
- **Unsupervised detection of decoupled subspaces: many-body scars and beyond**
  T. Szołdra, P. Sierant, M. Lewenstein, J. Zakrzewski,
  Phys. Rev. B 105, 224205 (2022)
- **Detecting ergodic bubbles at the crossover to many-body localization using neural networks**
  T. Szołdra, P. Sierant, K. Kottmann, M. Lewenstein, J. Zakrzewski,
  Phys. Rev. B 104, L140202 (2021)
- **Determination of Chern numbers with a phase-retrieval algorithm**
  T. Szołdra, K. Sacha, A. Kosior,
  Phys. Rev. A 99, 043611 (2019)

Education

Jagiellonian University in Cracow **2020 –**
PhD Studies in Theoretical Physics
Thesis: *Ergodicity breaking in quantum systems: from exact time evolution to machine learning*
Expected graduation: Jan 2025

Jagiellonian University in Cracow **2018 – 2020**
MSc Studies in Theoretical Physics
Thesis: *Anderson localization in time*
GPA: 4.83/5
Final grade: 5/5 (with distinction)

Jagiellonian University in Cracow **2015 – 2018**
BSc Studies in Theoretical Physics
Thesis: *Retrieval of Chern numbers from experimental data*
GPA: 4.86/5
Final grade: 5/5 (with distinction)

Grants

- *Detecting quantum many-body scars using neural networks*,
  Mini-grant from POB Digiworld at the Jagiellonian University (05.2021-05.2022), 20 000 PLN

Conference talks

- *Propagation of avalanches in the disordered Heisenberg model: a computational study*,
  APS March Meeting, Minneapolis (2024)
- *Machine learning parameters of femtosecond pulses based on photoelectron momentum distributions*, Molecular Ultrafast Science and Technology Conference, Grindelwald (2022) and Artificial Intelligence Photonics, San Sebastian (2023)

- *Measuring topological invariants in optical lattices*,
  Majorana Modes and Beyond Conference, Institute of Physics of Polish Academy of Sciences, Warsaw (2019) (invited speaker) and 25th Young Atom Opticians Conference, Hamburg (2019)

Posters

- *Unsupervised detection of decoupled subspaces: many-body scars and beyond*,
  Time Crystals Conference, Cracow (2023) - Best Poster Prize
- *Machine learning parameters of attosecond pulses based on photoelectron momentum distributions*, Machine Learning in Natural Sciences: From Quantum Physics to Nanoscience and Structural Biology, Hamburg (2022)
- *Time evolution of an interacting chain in cavity with artificial neural networks*,
  Open System Control of Atomic and Photonic Matter, Bad-Honnef (2022)
- *Detecting ergodic bubbles at the crossover to many-body localization using neural networks*, Quantum Optics X, Toruń (2021)
- *Determination of Chern numbers with a phase-retrieval algorithm*, Polish-German WE-Heraeus-Seminar, Bad-Honnef, (2019) and Time Crystals and Related Phenomena, Cracow (2019)

Seminars

- University of Regensburg (2024)
- Centre of Theoretical Physics of Polish Academy of Sciences, Warsaw (2023 and 2022)
- Institute of Photonic Sciences (ICFO), Barcelona (2023 and 2021)

Research stays

University of Regensburg **07.2024**
Complex Quantum Systems group of Klaus Richter (one month)

Institute of Photonic Sciences (ICFO), Barcelona **05.2023**
Quantum Optics Theory group of Maciej Lewenstein (one month)

Internships

Paul Scherrer Institut, Villigen, Switzerland **07-09.2017**
Ultracold Neutrons group

KAIST, Daejon, South Korea **07.2016**
Center for Axion and Precision Physics

Teaching

Jagiellonian University in Cracow **2020 – 2024**

- Physics of Ultracold Atoms (exercise classes), advanced MSc. level course in theoretical physics
- Selected Topics in Theoretical Physics 2 (exercise classes), MSc. level course in experimental physics (mainly quantum optics)
- Atomic Physics (exercise classes), BSc. level course for physics
- Electromagnetism (exercise classes), BSc. level course for biophysics
- Physics Laboratory 1 (laboratory classes), high school and BSc. level course

Awards

- Foundation for Polish Science START 2024 scholarship
  (100 scientists under 30 across all disciplines)
- International theoretical physics competition PLANCKS 2018 in Zagreb, 3rd place
- The University Physics Competition 2017 and 2016, silver medal
- Polish Physics Olympiad, finalist in 2014 and 2015

Scholarships

- Doctoral student scholarship in the NCN OPUS project "Many-body localization – cold atoms approach 2", 2020-2024
- Master student scholarship in the NCN OPUS project "Time crystals", 2018-2020
- Minister of Science and Higher Education scholarship, 2017/18, 2018/19, 2019/20
- Rector of Jagiellonian University Scholarship for top-10% students, 2015-2020
- GRAND scholarship, 2017-2020
- Fundusz Talenty scholarship, 2015-2020

Skills

- English - Cambridge English: Advanced (CAE), C1 Level
- Programming: Python, C++, Git, Jax, Tensorflow, Mathematica, Singularity, Weights&Biases