

# Curriculum Vitae

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## PERSONAL INFORMATION

Name: Tomasz Szoldra  
Year of birth: 1996  
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RESEARCH INTERESTS applications of machine learning in quantum physics, many-body localization, quantum many-body scars, open quantum systems, ultracold atoms

## PUBLICATIONS

- T. Szoldra, M. F. Ciappina, N. Werby, P. H. Bucksbaum, M. Lewenstein, J. Zakrzewski, A. M. Maxwell, *Femtosecond pulse parameter estimation from photoelectron momenta using machine learning*, New J. Phys. **25** 083039 (2023)
- T. Szoldra, P. Sierant, M. Lewenstein, J. Zakrzewski, *Tracking locality in the time evolution of disordered systems*, Phys. Rev. B **107**, 054204 (2023)
- T. Szoldra, P. Sierant, M. Lewenstein, J. Zakrzewski, *Unsupervised detection of decoupled subspaces: many-body scars and beyond*, Phys. Rev. B **105**, 224205 (2022)
- T. Szoldra, P. Sierant, K. Kottmann, M. Lewenstein, J. Zakrzewski, *Detecting ergodic bubbles at the crossover to many-body localization using neural networks*, Phys. Rev. B **104**, L140202 (2021)
- T. Szoldra, K. Sacha, A. Kosior, *Determination of Chern numbers with a phase-retrieval algorithm*, Phys. Rev. A **99**, 043611 (2019)

## EDUCATION

**Jagiellonian University, Cracow, Poland** **2020 –**  
*PhD student in theoretical physics*  
PhD thesis “Applications of Artificial Intelligence to Quantum Systems”  
Expected graduation: 2024.

**Jagiellonian University, Cracow, Poland** **2018 – 2020**  
*Master studies in theoretical physics*  
MSc. thesis “Anderson localization in time”,  
Grade: 5/5 (with distinction)

**Jagiellonian University, Cracow, Poland** **2015 – 2018**  
*Bachelor studies in theoretical physics*  
BSc. thesis “Retrieval of Chern numbers from experimental data”,  
Grade: 5/5 (with distinction)

## GRANTS

- “Detecting many-body quantum scars using neural networks” mini-grant from POB Digiworld at UJ (05.2021-05.2022), 20 000 PLN

## CONFERENCE TALKS (SELECTED)

- T. Szoldra, A. Maxwell, M. Ciappina, M. Lewenstein, J. Zakrzewski, *Machine Learning Parameters of Attosecond Pulses based on Photoelectron Momentum Distributions*, Molecular Ultrafast Science and Technology Conference, Grindelwald, Switzerland (2022)
- T. Szoldra, P. Sierant, M. Lewenstein, J. Zakrzewski, *Unsupervised detection of decoupled subspaces: many-body scars and beyond*, BEC Seminar at the Centre of Theoretical Physics of Polish Academy of Sciences, Warsaw, Poland (2022)
- T. Szoldra, A. Kosior, K. Sacha, *Measuring topological invariants in optical lattices*, Majorana Modes and Beyond conference, Institute of Physics of Polish Academy of Sciences, Warsaw, 2019 (as an “invited speaker”)
- T. Szoldra, A. Kosior, K. Sacha, *Measuring topological invariants in optical lattices*, 25th Young Atom Opticians Conference, Hamburg, Germany, 2019
- T. Szoldra, K. Sacha, *What is a time crystal?*, International Conference of Physics Students, University of Cologne, Germany, 2019

- T. Szoldra, K. Sacha, *The Harper-Hofstadter model*, International Conference of Physics Students, University of Helsinki, Finland, 2018
- T. Szoldra, *Laplace's window*, XIII RzKMF, Uniwersytet Rzeszowski, 2018, *distinction for the talk*
- T. Szoldra, A. Kosior, K. Sacha, *Topological Chern Numbers in Bose-Einstein Condensate*, International Conference of Physics Students, University of Turin, Italy, 2017

#### POSTERS

- T. Szoldra, J. Zakrzewski, *Time evolution of an interacting chain in cavity with artificial neural networks*, Open System Control of Atomic and Photonic Matter, Physikzentrum Bad-Honnef, Germany, 2022
- T. Szoldra, P. Sierant, K. Kottmann, M. Lewenstein, J. Zakrzewski, *Detecting ergodic bubbles at the crossover to many-body localization using neural networks*, Quantum Optics X, Toruń, Poland, 2021
- T. Szoldra, K. Sacha, A. Kosior, *Determination of Chern numbers with a phase-retrieval algorithm*, Polish-German WE-Heraeus-Seminar, Physikzentrum Bad-Honnef, Germany, 2019
- T. Szoldra, K. Sacha, A. Kosior, *Determination of Chern numbers with a phase-retrieval algorithm*, Time Crystals and Related Phenomena, Cracow, Poland, 2019
- T. Szoldra, A. Kosior, K. Sacha, *Gerchberg-Saxton Algorithm for Bose-Einstein Condensates in Harmonic Optical Traps*, International Conference of Physics Students, University of Malta, 2016

#### INTERNSHIPS

**Paul Scherrer Institut**, Villigen, Switzerland **07-09.2017**

Ultracold Neutrons Group

- Experimental physics internship, project „*Temperature monitoring system in the n2EDM experiment*”

**KAIST**, Daejeon, South Korea **07.2016**

Center for Axion and Precision Physics

- Theoretical physics internship, project „*Computational Conformal Geometric Algebra*”

#### TEACHING

**Jagiellonian University**, Cracow, Poland **10.2020 –**

- 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

#### AWARDS

- International theoretical physics competition PLANCKS 2018 in Zagreb, 3rd place
- The University Physics Competition 2017, silver medal
- The University Physics Competition 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”, 2020-2021
- 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 10% best students, 2015-2020
- GRAND scholarship, 2017-2020
- Fundusz Talenty scholarship, 2015-2020
- Iuvenes KNOW scholarship, 2015

#### SKILLS

- English - Cambridge English Advanced CAE certificate at C1 level
- Programming: Python, C/C++, Git, LaTeX, Scipy, Tensorflow, Qiskit, Jax