

# Patryk Kubiczek

COMPUTATIONAL PHYSICIST · QUANTITATIVE RESEARCHER · CLIMATE CHANGE EDUCATOR

Hamburg, Germany

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📍 patryk-kubiczek | 🌐 patryk-kubiczek | 📺 Patryk\_Kubiczek | 🎓 Google Scholar

## Summary

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- 5 years of quantitative modeling of physical problems resulting in 5 scientific publications.
- Physics studies-based critical thinking and problem solving skills.
- Strong computational and programming background.
- Competence in management tasks and workflow optimization.
- Professional experience in international and intercultural environment.
- Climate change expertise from voluntary educational work.

## Research Experience

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### Collaborative Research Center SFB 925, University of Hamburg

Hamburg, Germany

RESEARCH ASSISTANT

Sep. 2016 - Jun. 2019

- Developed and tested numerical methods of simulating complex quantum systems out of equilibrium (Monte Carlo, Lanczos algorithm, perturbation theory, machine learning).
- Co-invented and implemented a new quantum Monte Carlo method in over 7000 lines of C++ and Python code.
- Published a paper highlighted in a scientific journal and presented own research at 9 conferences, workshops and summer schools.
- Wrote a grant proposal and secured computing time at the HLRN supercomputer.
- Collaborated with partners from Russian Quantum Center, University of Michigan (USA) and Tel Aviv University (Israel).
- Delivered a block course on Monte Carlo methods in quantum physics.
- Provided IT support for other members of the research group.

### Institute for Theoretical Physics I, University of Hamburg

Hamburg, Germany

TEACHING ASSISTANT

Oct. 2018 - Mar. 2019

- Supervised a class in Statistical Physics for Bachelor students (in German).

### Condensed Matter Theory and Nanophysics Group, Jagiellonian University

Kraków, Poland

STUDENT RESEARCHER

Jan. 2015 - Jul. 2016

- Investigated numerically a phase diagram of a model for ferromagnetic superconductors.
- Co-authored 2 peer-reviewed scientific papers resulting from the research.

### Chair of Theory of Strong and Electroweak Interactions, University of Warsaw

Warsaw, Poland

STUDENT RESEARCHER

Oct. 2013 - Sep. 2014

- Modeled a novel phenomenon observed in statistical correlations in data from proton collisions at CERN, Geneva.
- Published 2 peer-reviewed scientific papers resulting from the research.

### Condensed Matter Theory and Nanophysics Group, Jagiellonian University

Kraków, Poland

STUDENT INTERN

Jul. 2013

- Wrote a section on de Haas-van Alphen effect for a new condensed matter physics handbook.

## Education

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### University of Hamburg

Hamburg, Germany

PHD CANDIDATE IN CONDENSED MATTER PHYSICS

Sep. 2016 - present

- Supervisor: Alexander I. Lichtenstein, Institute for Theoretical Physics I

### Jagiellonian University in Kraków

Kraków, Poland

MASTER OF SCIENCE IN THEORETICAL PHYSICS

Oct. 2014 - Jul. 2016

- Thesis: "Spin-triplet pairing in orbitally degenerate Anderson lattice model", supervisor: Prof. J. Spatek, grade: 5.0/5.0
- Erasmus+ exchange student at University of Bonn, Germany during winter semester 2015/2016
- Final grade: 4.93/5.00, award of distinction

### University of Warsaw

Warsaw, Poland

BACHELOR OF SCIENCE IN PHYSICS

Oct. 2011 - Sep. 2014

- Thesis: "Geometrical model for azimuthal correlations in proton-proton collisions", supervisor: Prof. S. D. Głazek, grade: 5.0/5.0
- Extended individualized study program, final grade: 4.72/5.00

## Publications

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**P. Kubiczek, A. N. Rubtsov, A. I. Lichtenstein:**

“Exact real-time dynamics of single-impurity Anderson model from a single-spin hybridization-expansion”,  
SciPost Phys. **7**, 016 (2019), Select label

**M. Fidrysiak, D. Goc-Jagło, E. Kądziaława-Major, P. Kubiczek, J. Spątek:**

“Coexistent spin-triplet superconducting and ferromagnetic phases induced by the Hund’s rule coupling and electronic correlations: Effect of the applied magnetic field”,  
Phys. Rev. **B 99**, 205106 (2019)

**E. Kądziaława-Major, M. Fidrysiak, P. Kubiczek, J. Spątek:**

“Spin-triplet paired phases inside a ferromagnet induced by Hund’s rule coupling and electronic correlations: Application to  $UGe_2$ ”,  
Phys. Rev. **B 97**, 224519 (2018)

**S. D. Głazek, P. Kubiczek:**

“Proton Structure in High-Energy High-Multiplicity p–p Collisions”,  
Few-Body Syst. **57**, 425 (2016)

**P. Kubiczek, S. D. Głazek:**

“Manifestation of proton structure in the initial-state anisotropies in high-energy proton-proton collisions”,  
Lith. J. Phys. **55**, 155 (2015)

## Academic Stays

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**Computational Condensed Matter Theory Group, University of Michigan**

*Ann Arbor, MI, USA*

GUEST RESEARCHER

*Nov. 2017 - Dec. 2017*

- Presented and discussed own research on quantum Monte Carlo methods at a group seminar.

**Theoretical Condensed Matter Physics Group, University of Bonn**

*Bonn, Germany*

GUEST STUDENT

*Oct. 2015 - Feb. 2016*

- Implemented from scratch a quantum Monte Carlo solver for dynamical mean theory in C++.

**Institute for Advanced Study in Princeton | Park City Math Institute**

*Park City, UT, USA*

PARTICIPANT OF UNDERGRADUATE SUMMER SCHOOL “MATHEMATICS AND MATERIALS”

*Jul. 2014*

## Honors & Awards

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2015	<b>Erasmus+ Scholarship</b> , awarded by Jagiellonian University for a student exchange	<i>Kraków, Poland</i>
2015	<b>Scholarship for student researchers</b> , awarded by Foundation of the Polish Science	<i>Kraków, Poland</i>
2014	<b>Scholarship for outstanding students</b> , awarded by the Rector of Jagiellonian University	<i>Kraków, Poland</i>
2014	<b>Best Poster Award</b> , Winter Kindergarten of Theoretical Physics	<i>Karpacz, Poland</i>
2010	<b>Laureate</b> , Polish Geography Olympiad	<i>Supraśl, Poland</i>

## Extracurricular Activities

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**Climate Hub Hamburg**

*Hamburg, Germany*

CO-FOUNDER & ACTIVE MEMBER

*Sep. 2018 - present*

- Organized and hosted 9 public events with guest climate experts.
- Consulted scientific literature on topics relevant to the events.
- Delivered 4 presentations on climate change causes, impacts and solutions.

**Climate Reality Project | Leadership Training**

*Berlin, Germany*

VOLUNTEER CLIMATE REALITY LEADER

*Jun. 2018*

**Physics Students Club, University of Warsaw**

*Warsaw, Poland*

CHAIRMAN & VICE-CHAIRMAN

*Mar. 2012 - Jun. 2014*

- Organized and hosted over 15 public lectures, panel discussions and workshops.
- Managed the team and administrative tasks.

## Conferences, Schools & Workshops

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Jun. 2019	<b>From Copenhagen to Katowice: 10 years of climate policy and climate change</b> , conference organized by Klimahaus Bremerhaven	<i>Bremerhaven, Germany</i>
May 2019	<b>Intel Workshop on Artificial Intelligence</b> , organized by HLRN computing center	<i>Göttingen, Germany</i>
Apr. 2019	<b>Scientific Writing</b> , two-day workshop by Jean-Luc Lebrun	<i>Hamburg, Germany</i>
Mar. 2019	<b>Winter School on Complexity Science</b> , organized by Complexity Science Hub Vienna	<i>Obergurgl, Austria</i>
Nov. 2018	<b>Sustainable Development in Action</b> , workshop organized by Heidelberg Center for the Environment	<i>Heidelberg, Germany</i>
Sep. 2018	<b>Climate Action Lab</b> , workshop organized by Global Youth Climate Network	<i>Hamburg, Germany</i>
May 2018	<b>Weekend Seminar on Environmental Physics</b> , organized by Young German Physical Society	<i>Bremen, Germany</i>
Apr. 2018	<b>Strongly Correlated Materials: Experiments and Computation</b> , conference	<i>Tel Aviv, Israel</i>
Mar. 2018	<b>Spring Meeting of the German Physical Society</b> , conference	<i>Berlin, Germany</i>
Oct. 2017	<b>Science: Polish Perspectives</b> , conference organized by Polonium Foundation	<i>Berlin, Germany</i>
Sep. 2017	<b>Les Houches Doctoral Training: Frontiers of Condensed Matter</b> , summer school	<i>Les Houches, France</i>
Jun. 2017	<b>645. WA-Heraeus Seminar: Emergent Phenomena and Universality in Correlated Quantum Systems Far Away from Equilibrium</b> , conference	<i>Bad Honnef, Germany</i>
Mar. 2017	<b>Spring Meeting of the German Physical Society</b> , conference	<i>Dresden, Germany</i>
Oct. 2016	<b>XX Training Course in The Physics of Strongly Correlated Systems</b> , summer school	<i>Vietri sul Mare, Italy</i>
Aug. 2016	<b>CAMD Summer School on Electronic Structure Theory and Materials Design</b> , summer school	<i>Lyngby, Denmark</i>
Sep. 2015	<b>Autumn School on Correlated Electrons</b> , summer school	<i>Jülich, Germany</i>
Mar. 2015	<b>Open Readings</b> , conference	<i>Vilnius, Lithuania</i>
Jul. 2014	<b>Undergraduate Summer School “Mathematics and Materials”</b> , organized by Institute for Advanced Study in Princeton	<i>Park City, UT, USA</i>
Mar. 2014	<b>Winter Kindergarten of Theoretical Physics</b> , winter school	<i>Karpacz, Poland</i>
Dec. 2013	<b>X Polish Workshop on Relativistic Heavy-Ion Collisions: Unreasonable effectiveness of statistical approaches to high-energy collisions</b> , conference	<i>Kielce, Poland</i>

## Skills

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### TECHNOLOGIES

<b>IT Tools</b>	Linux, Bash, Vim, Git, LaTeX, HTML, Markdown, Inkscape, Microsoft Windows, Microsoft Office
<b>Python</b>	NumPy, SciPy, SymPy, Pandas, Matplotlib, Scikit-Learn, Keras, Cython, h5py, mpi4py, Jupyter, PyCharm
<b>C++</b>	Armadillo, GNU Scientific Library, Boost, MPI, OpenMP, CMake, CLion
<b>Other</b>	Mathematica, Matlab, Julia

### TRANSFERABLE

<b>Research</b>	Data Analysis and Visualization, Mathematical Modeling, Critical Thinking
<b>Communication</b>	Scientific Writing, Scientific Presentation
<b>Leadership</b>	Academic Teaching, Public Speaking
<b>Management</b>	Workflow Optimization, Team Management, Event Organization
<b>Languages</b>	English (C2), German (C1), Polish (native)

## Interests

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Climate Change | Sustainability Science | Complexity Science | Political Science & Economy | Hiking, Skiing & Traveling