Dr Marcin Abram

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Professional Experience

Aug 2016 – Present
Machine Learning Engineer
at TypeScore in London, UK

Responsibilities: •Algorithm research and development (R&D). •Building and evaluating machine learning models. •Data Science. •Cloud computing. •Monitoring the latest technological developments and proposing new research directions.

Skills: Statistical Models, Neural Networks, Recurrent Neural Networks, Bayesian Inference, Natural Language Processing (NLP), Random Forests, Python 3, Tensorflow, Keras, ElasticSearch, MongoDB, Docker, AZURE and Google Cloud Services.

2011 – 2016
Research Assistant
at Jagiellonian University in Kraków, Poland

Team member, *"Correlations and coherence in quantum materials and structures (CCQM) – unique properties on macro and nano scale"* funded by the Foundation for Polish Science (2011-2015) and *"Fundamental Properties of Strongly Correlated Systems: Unconventional Superconductivity, Quantum Critical Behavior, and Complex Electronic Structure"*, funded by the National Science Center (2015-2016).

Responsibilities: •Mathematical modeling. •Analytical and numerical computation. •Software development (C++ & Python). •Algorithm optimization. •High-performance computing (on a supercomputer). •Data analysis and interpretation. •Scientific Writing (7 reviewed articles published in international journals). •Scientific presentations at conferences.

2013 – 2014
Teaching Assistant
at Jagiellonian University in Kraków, Poland

Led practical sessions for *Statistical Physics* course for students of third year of physics. Evaluated by students at 4.88/5.0 in 2013 and at 4.97/5.0 in 2014 (the annual university averages were 4.40 and 4.36 respectively).

Responsibilities •Exercise design and preparation. •Group teaching. •Preparing and marking exams.

2009 – 2015
Scientific Editor
at Jagiellonian University in Kraków, Poland

Editing and proofreading of *"Introduction to Condensed Matter Physics"* written by Prof. Józef Spałek. Book was published by PWN in 2015.

Responsibilities: Quality control of practice problems, proofreading and content editing, design of the LaTeX layout and management of all technical aspects of pre-production.

Education

2011 – 2016
PhD in Physics
Jagiellonian University, Kraków, Poland

Dissertation topic: *"Nonstandard Representation of Correlated-Fermion Models and its Application to Description of Magnetism and Unconventional Superconductivity."* Supervision: Prof. Józef Spałek and Dr. Michał Zegrodnik. Six articles were published based on this research. Degree awarded with distinction.

2012 – 2015
Interdisciplinary studies: *Society–Environment–Technology*
Jagiellonian University, Kraków, Poland

This competitive, application–only program for top PhD students, consisted of three years of coursework and independent research using social science, natural science and humanities research methods in English. Final mark: 4.4 (maximum 5.0)

2006 – 2011
MSc in Physics with wpecialization in *Theoretical Physics*
Jagiellonian University, Kraków, Poland

Dissertation topic: *"Selected methods of correlated particles applied to atomic systems in optical lattices."* Supervision: Prof. Józef Spałek. During my 5 year Master's program I accummulated 413.5 ECTS points due to a large number of non-obligatory courses (in the European Union 300 points are sufficient to obtain an MSc degree). Final mark: 5.0 (maximum 5.0)

2009 – 2012
BSc in Computer Science
Jagiellonian University, Kraków, Poland

Obtained independently from the Physics program, as a second degree. Final project resulted in a publication in a world-class journal, *Physical Review E* (Statistical, Nonlinear, and Soft Matter Physics). Final mark: 4.5 (maximum 5.0)

Feb – Jun 2010
Physics Study Abroad
Niels Bohr Institute, Copanhagen, Denmark

Study abroad funded by the Erasmus Scholarship Program.

Awards (selection)

• 2013 – 2015, Exceptional Doctoral Performance Award (awarded to the top 15% of PhD students departmentally).

• 2012 – 2015, Scholarship: participation in *Interdisciplinary Ph.D. studies in English* program at Jagiellonian University in Kraków.

• 2008 – 2009, Academic Achievement Scholarship.

• April 2006, Finalist (top 60) in the LV Polish Physics Olympiad.

• March 2006, Finalist (9th place) in the XLIX Polish Astronomy Olympiad.

Essential Skills

•Mathematics and Modeling

- Statistics, Advanced Algebra, Differential Equations, Stochastic Processes.
- Mathematical Modeling, Numerical Simulations, Algorithm Optimization, Data Analysis.

•Machine learning

- Deep Neural Networks, Recurrent Neural Networks (RNN), Long Short-Term Memory (LSTM).
- Bayesian Inference, Bayesian Neural Networks.
- Natural Language Processing (Skip-gram, CBOW).
- Decision Trees, Random Forests.
- Regressions, ANOVA, Nested Models.

•Programming and Software Development

- Python 3: experience with *numpy*, *SciPy*, *pandas*, *scikit-learn*, *tensorflow*, *Keras*, *PyMC3*.
- C/C++: experience with *OpenMP*, *GSL*, *Boost*.
- Agile Methodologies, Test Driven Development, Scrum, Unit Testing, Continuous Integration, Version Control (git), Containerization (Docker).
- Other Languages: R, Bash.

•Tools & Technologies

- NoSQL Databases: *MongoDB*
- Cloud Computing: *Microsoft AZURE* and *Google Cloud Platform*.
- Data Visualization: *gnuplot* (standalone), *ggplot* (R), *matplotlib* (Python) and *Root* (C++).
- Professional software: *Wolfram Mathematica*.
- Linux, LaTeX, *Elasticsearch*.

•Communication Skills

- Scientific Writing and Presentation.
- Teaching (high-school and university level).

Publications

7 publications published in world-class scientific journals that got over 60 citations in the last 3 years:

• M. Abram, M. Zegrodnik, and J. Spałek, J. Phys.: Condens. Matter **29**, 365602 (2017).

• M. Abram, M. M. Wysokiński, and J. Spałek, J. Magn. Magn. Mater. **400**, 27–30 (2016).

• M. M. Wysokiński, M. Abram, and J. Spałek, Phys. Rev. B **91**, 081108(R) (2015).

• M. M. Wysokiński, M. Abram, and J. Spałek, Phys. Rev. B **90**, 081114(R) (2014).

• A. Kapanowski and M. Abram, Phys. Rev. E **89**, 062503 (2014).

• M. Abram, Acta. Phys. Pol. A **126**, 25 (2014).

• M. Abram, J. Kaczmarczyk, J. Jędrak, and J. Spałek, Phys. Rev. B **88**, 094502 (2013).

Teaching (selection)

• 26 Apr 2018
Python data science bootcamp in London.

• Feb – Jun 2013 and Feb – Jun 2014
Statistical Physics (30 hours each term).

• Oct 2012 – Feb 2013
Physics with Biophysics Elements (15 hours).

Conferences (selection)

• April 2018 – *"PyData London 2018"*, workshop and conference (organiser and instructor).

• July 2015 – *"20th International Conference on Magnetism"*, Barcelona, Spain (poster).

• June 2015 – *"Cracow Colloquium on f-electron systems"*, Kraków, Poland (lecture).

• Sept 2014 – *"From Spins to Cooper Pairs: New Physics of Spins"*, Zakopane, Poland (lecture).

• March 2014 – *"XVI National Conference on Superconductivity"*, Zakopane, Poland (lecture).

• October 2013 – *"50th Karpacz Winter School of Theoretical Physics"*, Karpacz, Poland (poster).

• Jul 2012 – *"Quantum Monte Carlo: Fundamentals and Applications"*, University of Illinois, Urbana-Champaign, IL, USA.

Volunteering

• Help in organization of *PyData London 2018* conference (London, 26-29 April 2018).

• Math tutor in the Center for the Blind and Visually Impaired (Kraków, 2012 – 2014).

• Leading physics workshops for gifted high-school students (Kraków, 2011 – 2014).