

Johannes S. Otterbach, Ph.D.

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PROFILE

Self-motivated Ph.D.-level Physicist with a curious, analytical mind and a passion for all things AI, quantum and data. Experience building large-scale machine learning systems, managing and analyzing data and developing algorithms and software for near-term quantum hardware. Expert knowledge of advanced mathematics, statistics, machine learning and AI, and strong communication skills for presenting and visualizing complex concepts to diverse audiences.

PROFESSIONAL DEVELOPMENT

Machine Learning Researcher

06/2018 - present

OpenAI, San Francisco, CA

- Basic research in the area of Unsupervised and Generative Modelling with focus on Likelihood-based models.
- Mentoring of OpenAI Scholars, promising individuals from diverse backgrounds without prior experience in Machine Learning or AI.
- Design of ETL Pipeline to facilitate aggregation of new datasets of unprecedented scale and a more than 10x speedup over previous methods.
- Shaping of internal data policy and engaging with external AI policy organization as well as participating in workshops on AI and cybersecurity.

Science and Technology Advisor - AI

09/2019 - present

Syntegra, Inc., San Francisco, CA

- Advise on application, development and deployment of state-of-the-art deep learning models in healthcare contexts.
- Guide and review the design of basic AI-training and deployment as well as data infrastructure.

Research Scientist and Software Engineer

04/2017 - 05/2018

Rigetti Quantum Computing, Berkeley, CA

- Prototyping and demonstrating applications for near-term quantum devices, such as Quantum Machine Learning and Combinatorial Optimization Problems.
- Developing and maintaining an OCaml-based simulator of a quantum processing unit.
- Managing, coordinating and actively participating in a small research team for near-term applications.
- Engaging with customers; estimating benefits using quantum computations and translating problems to quantum algorithms.

Senior Data Scientist

12/2016 - 03/2017

Data Scientist

08/2015 - 11/2016

LendUp, San Francisco, CA

- Architected new machine learning model scoring service with ability to serve models developed in several different languages and frameworks.
- Implemented Python variants of various learning algorithms, such as Generalized Additive Models and Constrained Linear Models.
- Contributed to key algorithms to generate model insights and auditability for regulatory compliance.
- Supported Data Scientists with ad-hoc and production algorithms for feature analysis and selection. Provided dashboards and automated reports for business stakeholders.
- Developed and deployed several models for credit underwriting, including models for new products. Integrated new data sources into production systems to increase data redundancy.

Infrastructure Quality Engineer (Machine Learning)

04/2014 - 07/2015

Palantir Technologies, London, UK (until 1/2015) and Palo Alto, CA

- Analyzed TB-sized, disparate customer-dataset and implemented new propensity model pipeline using Apache Spark, surfacing previously unknown churn indicators.
- Solidified and scaled end-to-end PySpark ETL-machine learning pipeline, resulting in a $\sim 5x$ increase in handled data-scale and $\sim 5x$ decrease of training time.
- Reduced feature engineering development times by 3x through creating new featurization prototypes in quick iterations with product and data-science teams.
- Deployed, debugged and maintained complex, distributed software stacks, containing Apache Spark, Hadoop HDFS and IPython Notebook servers, on cloud-based AWS systems. Optimized the stacks for best computational performance and stability.
- Developed CometD-based user-scale testing and analytics framework resulting in a $\sim 10x$ improvement in handled users.

Postdoctoral Research Fellow (Theoretical Quantum Physics)

09/2011 - 03/2014

Harvard Quantum Optics Center, Cambridge, MA

- Studied phase diagrams of strongly interaction 1D cold atom systems with numeric and analytic tools.
- Simulated the time-evolution of models with spatial and temporal randomness using Markov processes and ensemble theory, creating insights into highly correlated states of matter.
- Explained and matched experimental observations to theoretical models using fitted statistical simulations and analytic solutions.
- Presented research results to general as well as expert audiences through invited seminars, conferences, talks and posters.
- Collaborated, influenced and contributed to research projects with international teams.

EDUCATION**Ph.D. in Physics**, *GPA: 4.0 with distinction*, 10/2011

Theoretical Quantum Optics Group of Prof. Dr. M. Fleischhauer
University of Kaiserslautern, Germany

B.S./M.S. in Physics, *GPA: 3.93*, 5/2008

University of Kaiserslautern, Germany

TECHNICAL SKILLS

- Programming languages: Python, Java, Apache Spark, Scala, JavaScript, SQL and Shell scripting. Familiarity with OCaml, Cython/C, Hadoop HDFS, AWS S3, R as well as ReactJS, Redux and Gatsby.
- Experience with mathematical and statistical Python libraries such as pandas, scikit-learn, NumPy and SciPy, PyTorch, TensorFlow, Owl, and software such as MATLAB and MATHEMATICA.
- Advanced mathematics and physics toolset paired knowledge of software best practices and applied machine learning ideally suited to tackle bleeding-edge challenges in AI and Deep Learning.

SELECTED SCHOLARSHIPS AND AWARDS

Prize Fellowship of the Harvard Quantum Optics Center	2011-2013
2011 Award of the Friends of the University of Kaiserslautern for an outstanding scientific performance as a Ph.D. student in physics	6/2012
Foundation of German Business scholarship	2005-2008

SELECTED PUBLICATIONS

20 in total with 200+ citations. Complete list available upon request.

1. J. S. Otterbach et. al., *Unsupervised Machine Learning on a Hybrid Quantum Computer*, arxiv:1712.05771.

2. A. V. Gorshkov, J. Otterbach, E. Demler, M. Fleischhauer, M. D. Lukin, *Photonic Phase Gate via an Exchange of Fermionic Spin Waves in a Spin Chain*, Phys. Rev. Lett. 105, 060502 (2010)
3. J. Otterbach, M. Moos, D. Muth, M. Fleischhauer, *Wigner Crystallization of Single Photons in Cold Rydberg Ensemble*, Phys. Rev. Lett. 111, 113001 (2013).

LANGUAGE SKILLS

German: Native speaker. English: Fluent. Swedish and French: Basic

ACTIVITIES

Avid boulderer and climber. Enjoys slacklining and a good game of Ultimate Frisbee with friends. Good food or an outdoor trip are always welcome.