Dr. Raoul Malm

German citizenship

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Work Experience

since 09/2019 **Analyst at d-fine GmbH, Frankfurt am Main**
- Software development in Python with agile methods and CI/CD
- Data quality management using SAS

10/2018 - 05/2019 **Researcher at Swiss AI Lab IDSIA, Lugano**
Working group of Prof. Dr. Jürgen Schmidhuber
Topic: Artificial curiosity in deep reinforcement learning

10/2017 - 09/2018 **Professional Reorientation:** Self-teaching Machine Learning and Computer Vision by taking online courses, studying scientific books and research papers, and writing source code.

01/2017 - 09/2017 **Sabbatical:** Travelling in Nepal, Myanmar, Thailand, Hong Kong, China and Japan; Trekking to the Everest Base Camp in Nepal, climbing Mont Blanc in France, running the Zugspitze trail-marathon near Munich and the city marathons in Cologne and Frankfurt

05/2011 - 12/2016 **Research assistant in Theoretical Physics, Johannes Gutenberg-University Mainz**
Working group of Prof. Dr. Matthias Neubert
Topics: physics beyond the Standard Model, collider physics and phenomenology

04/2008 - 04/2009 **Research assistant in Experimental Physics, Johannes Gutenberg-University Mainz**
Working group of Prof. Dr. Arnold Rauschenbeutel
Project: "Construction of an Optical Fiber-based Biosensor"

05/2005 - 01/2006 **Civilian service**, St. Vincenz and Elisabeth Hospital in Mainz, Germany

Education

08/2012 - 11/2016 **Dr. rer. nat. in Theoretical Physics with Distinction, Grade: 0.7 (summa cum laude)**
Johannes Gutenberg-University Mainz
Thesis: "Five-dimensional Perspective on Higgs Physics and the $b \to s\gamma$ Transition in a Warped Extra Dimension" (d-nb.info/1120148685/34)
Supervisor: Prof. Dr. Matthias Neubert

04/2006 - 05/2012 **Dipl.-Phys. in Theoretical Physics, Grade: 1.0 (very good)**
Johannes Gutenberg-University Mainz
Thesis: "Mitigation of the ϵ_K Fine-tuning Problem in the Randall-Sundrum Model"
Supervisor: Prof. Dr. Matthias Neubert

08/1996 - 03/2005 **Secondary School (Abitur), Grade: 1.6 (good)**
"Gymnasium am Kurfürstlichen Schloss" in Mainz

Programming Skills

Python (3), TensorFlow (2), SAS/SQL (2), R (1), C++ (1), Git (2), Unix (1)

The number in each round bracket shows my experience on a 5-point scale from 1 (basic knowledge) to 5 (complete knowledge) of the corresponding language.

Software Projects

2020 Development of a credit quality review application in Python using Qt for the GUI, sqlalchemy to access MySQL/Oracle, Jenkins for continuous integration and agile methods with Jira for continuous development.

2019 Implementation of deep reinforcement learning agents (DDPG, DQN, PPO, VPG) in Python using TensorFlow to solve various environments, e.g. 2D mazes and OpenAI gym environments Pong, CartPole, Pendulum. One of the projects focused on artificial curiosity where a model of the environment is learnt to improve the agent's exploration behaviour.

2018 Nuclei segmentation of microscopic images (2018 Data Science Bowl) by coding a U-Net shaped 10-layer CNN in Python using TensorFlow, where the main computation is performed on an Nvidia GPU in the Google cloud. I finished the Kaggle contest in the top 14%.

2011 - 2016 Numerical analysis of Higgs/Flavour physics in warped extra dimensions using Mathematica.

2004 Basic speech recognition software written in C++ in order to navigate a small vehicle by speaking commands into a microphone. ("Jugend forscht" project)

MOOC Certificates

2018 Coursera: "Machine Learning" & "Deep Learning Specialisation" & "Algorithms"

Awards

05/2017 Prize for excellent doctoral thesis given by "Friends of Mainz University"

05/2013 - 05/2015 Junior membership of the Gutenberg Academy, Johannes Gutenberg-University Mainz

08/2012 - 08/2014 Fellowship through the Graduate School "Symmetry Breaking in Fundamental Interactions" (DFG/GRK 1581), Student representative from 08/2013 till 08/2014

30/01/2013 Prize for outstanding diploma thesis of the faculty Physics, Mathematics and Computer Science, Johannes Gutenberg-University Mainz

02/2004 First place in "Jugend forscht" (German youth science competition) at the regional level C++ project: "Speech Recognition: Realisation and Application"

Peer-reviewed Scientific Papers

2016 R. Malm, M. Neubert, C. Schmell, JHEP **04**, 042 (2016), arXiv:1509.02539 [hep-ph]

2015 R. Malm, M. Neubert, C. Schmell, JHEP **02**, 008 (2015), arXiv:1408.4456 [hep-ph]

2014 J. Hahn, C. Hörner, R. Malm, M. Neubert, K. Novotny, C. Schmell, Eur. Phys. J. $C74$, 2857 (2014), arXiv:1312.5731 [hep-ph]

2014 R. Malm, M. Neubert, K. Novotny, C. Schmell, JHEP **01**, 173 (2014), arXiv:1303.5702

2012 M. Bauer, R. Malm, and M. Neubert, Phys. Rev. Lett. **108**, 081603 (2012), arXiv:1110.0471

Selection of Talks

2015 "Loop Processes and Higgs Phenomenology in a Warped Extra Dimension", Physics seminar, Ludwig Maximilian University of Munich

2014 "Loop Processes and Higgs Phenomenology in a Warped Extra Dimension", Graduate Summer School, Frauenchiemsee

2013 "5D Perspective on Higgs Production via Gluon Fusion at the Boundary of a Warped Extra Dimension", Graduate School Retreat, Eberbach Abbey, Eltville

2012 "Mitigation of the ϵ_K Fine-tuning Problem in the Randall-Sundrum Model", Graduate School Retreat, Bad Kreuznach

Stays Abroad

06/2014 - 07/2014 Summer school TASI 2014 "Journeys Through the Precision Frontier: Amplitudes for Colliders" at the University of Colorado, Boulder, USA

01/2014 - 02/2014 Winter school "GGI Lectures on the Theory of Fundamental Interactions" at the Galileo Galilei Institute for Theoretical Physics, Florence, Italy

05/2013 - 06/2013 Workshop "Exploring the TeV Scale New Physics with LHC Data" at the Kavli Institute for Theoretical Physics at the University of California, Santa Barbara, USA

Languages German (native), English (fluent), French (basics)

Personal Interests Trail Running | Climbing