Niklas S. Nolte

Personal Data

Name:	Niklas Stefan Nolte
Place and Date of Birth:	Hildesheim, Germany | 12.12.1994
Address:	15 Beacon St. #1, Cambridge 02143, MA, USA
Phone:	+1 8572698661 / +49 15789394570
email:	niklas@nolte.dev
GitHub:	niklasnolte
StackOverflow:	nnolte

Work Experience

03/2021-present	Postdoctoral Associate at Massachusetts Institute of Technology (MIT) • AI Research & Fundamental Physics - IAIFI Project Understanding Generalization, Lipschitz Networks, Robustness, Inductive Biases • Research and software development for the High Level Trigger (HLT) at the LHCb Experiment at CERN, applying our developed AI architectures in high stake environments.
11/2017-02/2021	Doctoral thesis at European Organization for Nuclear Research (CERN) *A Selection Framework for LHCb's Upgrade Trigger* Full time research and software development for the HLT and detector upgrade of LHCb planned for 2021/2022: • High Performance Computing (CPU & GPU) • Data model design for convenient vectorization and cache efficient access • Task scheduling, efficient and lock-free multi-threading
10/2016-09/2017	Master's thesis *Search for Lepton Flavor Violation in $\phi \to e^+\mu^-$ decays* I developed central parts of the analysis, mostly focusing on signal extraction based on physical/kinematic properties of the final state, correction of decay specific simulation and statistical evaluation of the detector's sensitivity for this decay.
04/2015-07/2015	Bachelor's thesis *Search for Lepton Flavor Violation in $B^+ \to K^+e^+\mu^-$ decays* In close collaboration with a colleague I studied decay statistics, laying out the ground work for the full analysis PRL123(2019)241802.

Scientific Education

11/2017-02/2021	Physics PhD student with specialization on high performance software development and machine learning for physics, supported by the Wolfgang-Gentner scholarship / CERN & TU Dortmund University.
10/2018	CERN School of Computing in Israel
10/2015-10/2017	Master of Science in Physics / TU Dortmund University
10/2012-09/2015	Bachelor of Science in Physics / TU Dortmund University
09/2004-06/2012	Abitur / Geschwister-Scholl-Gymnasium Lüdenscheid

Publications and Invited Talks

2022	*Expressive Monotonic Networks* (not yet public), submitted to ICLR 2023
2022	*Finding NEEMo: Geometric Fitting using Neural Estimation of the Energy Movers Distance* Submitted to ML4PS, NeurIPS 2022
2022	Towards Understanding Grokking: An Effective Theory of Representation Learning, NeurIPS 2022
2022	*A Comparison of CPU and GPU Implementations for the LHCb Experiment Run 3 Trigger* Comput Softw Big Sci, doi:10.1007/s41781-021-00070-2
Talk 2021	Winteracademy TU Dortmund "Mit KI die Welt erklären: Ultraschnell interessante Physik finden" (Outreach for german high school kids, *Winteracademy website*)
2021	*Robust and Provably Monotonic Networks* ML4PS, NeurIPS 2021
2021	*Evolution of the energy efficiency of LHCb's real-time processing*, EPJ, doi:10.1051/epjconf/202125104009
2019	*The core software framework for the LHCb Upgrade* IOPScience, doi:10.1088/1742-6596/1525/1/012052
2019	*Configuration and scheduling of the LHCb trigger application*, EPJ, doi:10.1051/epjconf/202024505004
2018	*New Approaches to track reconstruction in LHCb's Vertex Detector*, EPJ, doi:10.1051/epjconf/201921401042
Ongoing	I am part of the LHCb collaboration that works together to publish regularly, based on the joint work on the detector and the analysis of the resulting data at the LHC, see the homepage

Training and Supervision

06/2021-present	Supervising a PhD student
04/2021-04/2022	Supervised a Master student, successful completion with best grade
05/2017-08/2017	Supervised a Bachelor student, successful completion with good grade
Occasionally	Teaching C++ at Hackathons within the LHCb collaboration
02/2017	Teaching Assistant for "Statistical Methods of Data Processing" at TU Dortmund
2010-2017	Private tutor for Physics and Mathematics
since 2008	Volunteer worker for youth groups at church, summer camps etc.

Awards and Extraordinary

2021	LHCb Early Career Scientist Award
2018	Wolfgang-Gentner Scholarship
in School	Skipped grades 2 and 10

Expertise

Languages	German (native) English (C2) Spanish (A2)
Computing	Expert level of C++ (STL, BOOST) Expert level of python with math, tensor manipulation and automatic differentiation libraries Intermediate level of Haskell, Julia git, (gitlab, github), zsh/bash LaTeX UNIX systems