Dr. Alexander Voigt

Curriculum vitae

Personal data

E-Mail	ahgvoigt@gmail.com
Date of birth	14.08.1984 in Dresden, Germany
Nationality	German
Website	https://users.hepforge.org/~avoigt/
ORCID	https://orcid.org/0000-0001-8963-6512
Github	https://github.com/Expander
arXiv	https://arxiv.org/a/voigt_a_2.html

Profile

- 10 years experience in scientific research, development of scientific software and algorithms, analytic methods and model building

- Personal background: theoretical physicist (PhD) (minor subject: computer science)

- Specialized in: automation of complex analytic and numerical calculations and implementation into scientific software (C++, Wolfram/Mathematica, Python, Julia)

- Experience in the development and application of machine learning algorithms

- Experience in the planning, coordinating and supervision of research projects and research teams up to five people

- Many years of experience with the publication and presentation of scientific results and physics-related topics

- 15 years experience in teaching mathematics and physics courses at the university level

Career

since 2020 **Lecturer** at the "Institute of Energy and Life Science" at the Flensburg University of Applied Sciences
Responsibility:
- Giving lectures, exercise and laboratory courses for engineering students
- Deputy head of the planetarium Glücksburg

Research:
- Extension of the C++ library FlexibleSUSY to perform a high precision prediction of the light Higgs pole mass in the MSSM with N^3LO+N^3LL precision.
- Extension of the C++ library FlexibleSUSY to perform a high precision prediction of the W boson pole mass in models beyond the Standard Model.
- Extension of the C++ library FlexibleSUSY to calculate decays of scalar particles (in particular Higgs bosons) in models beyond the Standard Model.
- Extension of the C++ library GM2Calc for the precise prediction of the anomalous magnetic moment of the muon in the Two-Higgs Doublet Model.
- Port of the polylogarithm library to Rust (polylog.rs) and Julia (PolyLog.jl).
- Development of the ClausenFunctions.jl library for the numerically precise and time-efficient calculation of higher order Clausen functions.

2019–2020 **Scientific staff** at the "Institute of mathematic, scientific and technical literacy section of physics, its didactics and its history" at the Europe University of Flensburg
Responsibility:
- Giving lectures and exercises for students studying physics education

Research:
- Extension of the C++ library Himalaya for the precise prediction of the Higgs mass in the MSSM for large SUSY scales.

2016–2019 **Scientific staff** at the "Institute for Theoretical Particle Physics and Cosmology" at the RWTH Aachen University
Responsibility:
- Design and supervision of research projects from the field of *Physics Beyond the Standard Model*; leading and supervision of several research teams
- Planning and organization of exercise courses for different theoretical physics lectures; in particular creation of exercise sheets, giving tutorials and exams
- Planning and supervision of research projects for Ph.D., bachelor and master students

Research:
- Development of the C++ library Himalaya for the precise prediction of the Higgs mass in the MSSM
- Coordination of the extension of the C++ framework FlexibleSUSY concerning the numerical prediction of particle decays
- Implementation of the C++ library polylogarithm for the numerically precise and time-efficient calculation of higher order polylogarithms
- Calculation of generic expressions for the precise and systematic study of effective field theories
- Launching the conan-hep organization for the community development of Conan packages for software packages from high-energy physics

2014–2016 **Scientific staff** at DESY (Hamburg)

Responsibility:
- Design and supervision of research projects from the field of *Physics Beyond the Standard Model*; leading and supervision of several research teams

Research:
- Development of a precise and time-efficient method for the prediction of the Higgs mass and implementation into the C++ framework FlexibleSUSY
- Development of the C++ library GM2Calc for the precise calculation of the anomalous magnetic moment of the muon
- Study of the validity of models beyond the Standard Model by comparison of model predictions with experimental data

2010–2014 **Doctorate** at the "Institute of Nuclear and Particle Physics" (IKTP) at the TU Dresden University

Responsibility:
- Planning and organization of exercise courses for different theoretical physics lectures; in particular creation of exercise sheets, giving tutorials and exams
- Maintenance of the Typo3 content management system of the institute's website

Research:
- Precise calculation of elementary particle masses in models beyond the Standard Model
- Ph.D. thesis on *Mass spectrum prediction in non-minimal supersymmetric models*, degree: Dr. rer. nat., grade: summa cum laude

2010 **Research project** at CERN (Geneva)
- Title of the research project: *Boosting PDE-Foam*
- Development implementation and study of boosting algorithms for the statistical classifier PDE-Foam
- Development of a python package for simple job distribution for the LSF batch system

Education

2004–2010 **Studying Physics** at the TU Dresden University
- Title of the diploma thesis: *The Calculation of Threshold Corrections to Renormalization Group Running in the Exceptional Supersymmetric Standard Model*
- Degree: Diplom-Physiker, Grad: 1,0
- Minor subject: computer science

2008 **Summer student** at CERN (Geneva)
- Title of the research project: *"Likelihood estimator using self-adapting phase-space binning (PDEFoam)"*
- Development of the new statistical classifier PDE-Foam based on adaptive phase space binning and implementation into the C++ machine learning framework TMVA

2007 **Internship** at the Institute of Nuclear and Particle Physics (IKTP) at the TU Dresden University
- Title of the research project: *"Datenanalyse bei ATLAS – Machbarkeitsstudie zur Untergrundabschätzung aus Daten"*
- statistical data analysis in C++ with ROOT
- reconstruction of physical scattering processes at the ATLAS detector

2003 **High School**, Marie-Curie-Gymnasium Dresden
Research project with the title *"Strahlung aus dem Atomkern"* at the TU Dresden University

Civil service

2003–2004 Civil service at the blood donation service at the German Red Cross in Dresden

Awards

2023 Award for excellent teaching for the lecture *"Physik"* at the Flensburg University of Applied Sciences

2018 Joint award for excellent teaching for the lecture *"Einführung in die Theoretische Physik"* in the summer term 2018 at the RWTH Aachen University

2009–2013 Research grant by the graduate academy *"Masse, Spektrum, Symmetrie"* (GK 1504)

Further work

since 2017 Referee for the international journals *The European Physical Journal C*, *Computer Physics Communications*, *Physical Review D*

2018 Guest lecturer at the summer academy of the Studienstiftung des deutschen Volkes on the topic *"Es geht ums Prinzip: Was steckt hinter den Gleichungen der Physik?"*

2017 Supervisor of a workshop for pupils for the MILeNa project at the RWTH Aachen University

2015 Scientific advisor at a workshop of the *Netzwerk Teilchenwelt* for teachers at CERN (Geneva) for the development of teaching and learning material for particle physics at schools

Further education

2020–2023 Workshops on various educational topics (Flensburg University of Applied Sciences)

2019 Workshops on time management, self-organization and de-escalation (RWTH Aachen)

2014 First aid course (TU Dresden)

2013 Workshop at the Humboldt-Graduate School on the topic *"Scientific Writing (Natural Sciences)"* (HU Berlin)

Memberships

2009–today Member of the *Deutsche Physikalische Gesellschaft (DPG)*

Computer skills

Languages C/C++, Wolfram/Mathematica, Python, Pascal/Delphi, Bourne Shell, Julia, LaTeX, HTML, CSS, PHP, Rust, SQL, XML, XSLT

Software awk, clang, CMake, Conan, Emacs, gcc, Git, GNU Make, Linux, Meson, ROOT, RWTHmoodle, RWTHonline, sed, SQLite3, TMVA, Typo3, Wordpress

Other	Touch typing with Colemak keyboard layout

Natural languages

German	Mother tongue
English	excellent, written and spoken
French	school knowledge

Other

2002–2005	Volunteer in federal and state elections
since 2002	electric guitar