Philipp Alexander Kreer

Curriculum Vitae

Personal Information

- Nationality: German
- Place of Birth: Mainz, Rhineland-Palatinate, Germany
- Date of Birth: 25. February 1998
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Education

Since October 2021	**Technische Universität München**, *PhD in Physics*, Applications of Quantum Field Theory in the Standard Model of particle physics.
October 2019 – July 2021	**Johannes Gutenberg-Universität**, *Master of Science Physik*, Mainz, Grade: 1.0 equivalent to A grade.
February 2020 – June 2020	**Research stay at University of Zürich**, *Project with Prof. Dr. Daniel Wyler and Prof. Dr. Gino Isidori on the Standard Model Effective Field Theory.*
October 2016 – July 2019	**Johannes Gutenberg-Universität**, *Bachelor of Science Physik*, Mainz, Grade: 1.4 equivalent to A grade.
September 2018 – January 2019	**Université de Toulouse III – Paul Sabatier**, *Semester abroad.* Science de l'Univers et Téchnologie Spaciale
July 2016 – September 2016	**Camino de Santiago**, Le Puy-en-Vellay nach Santiago de Compostela.
2008–2016	**Bischöfliches Willigis-Gymnasium**, *Allgemeine Hochschulreife (higher education entrance qualification)*, Final grade: 1.3 equivalent to A grade, Mainz, major subjects: Physics, Math, and History.

Master's thesis

Title	Feynman Integrals for Black Holes: The Unequal Mass H-Graph
Supervisor	Prof. Dr. Stefan Weinzierl & Prof Dr. Tobias Hurth

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Final grade	1.0, equivalent to A grade
Summary	Application of particle physics integration framework to general relativity. Implementation of results in Mathematica and GiNaC.
Publication	○ Philipp Kreer, Stefan Weinzierl: *The H-graph with equal masses in terms of multiple polylogarithms*, Physics Letters B, Volume 819, 2021, arXiv:2104.07488. ○ Philipp Kreer, Robert Runkel, Stefan Weinzierl: *Feynman integrals for binary systems of black holes*, 15th International Symposium on Radiative Corrections: Applications of Quantum Field Theory to Phenomenology, Tallahasse, FL, USA, 17-21 May 2021, arXiv:2110.15654.

Bachelor's thesis

Title	Maximal Cuts in Baikov Representation
Supervisor	Prof. Dr. Stefan Weinzierl & Prof. Dr. Martin Reuter
Final grade	1.0, equivalent to A grade
Summary	Development of integration techniques and application to Feynman integrals.

Further Education and Applied

Since summersemester 2019	**Teaching assistant**, Several lectures including: Mathematical preparation course for biologist, Theoretical Quantum Mechanics, Theoretical Classical Mechanics, Electrodynamics, Experimental Particle Physics.
March 2018 – July 2021	**Research Assistant as Assistant Operator in Control Center of Mainzer Mikrotron MAMI**, Maintance and supervision of particle accelerator MAMI, interruption due to semester abroad.
October 2022 – December 2022	**G2Net Detecting Continuous Gravitational Waves**, Application of machine learning to gravitational wave detection, kaggle competition.
August 2023	**ML4Good AI Safety Bootcamp**, *Implementation of modern AI architectures e.g. transformers, performing adveserial attacks, literature review on AI Alignmnet, theoretical physics concepts to interpret AI sytems (Singular Learning Theory, Effective Field Theory of Deep Learning).*

Social engagement

Winter semester 2023/24	**Read & Eat: Physics meets AI Safety**, *Seminar on theoretical physics solutions towards AI interpretability and security.*
Since May 2023	**Active participant in the local Effective Altruism Group Munich**.

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Since October 2022 **Cooking tutor at Katholische Hochschulgemeinde der Ludwigs-Maximilian Universität**, *Organising and cooking dinners for the christian student union of the Ludwigs-Maximilian University.*

Since 2019 **Foodsaver for Foodsharing e.V.** , Initiative for a social and sustainable management of food.

2015 – 2016 **Management of the school group FAIRrücktKREATIVnachHALTig**.
Course management and oragnization in the context of the all-day school program of the Willigis-Gymnasium in Mainz on the topics of sustainability, nature and responsibility for the environment and people.

2014–2015 **Support in managment of school group History**.
Support in course managment in the context of the all-day school program of the Willigis-Gymnasium in Mainz on several topics on history.

Awards

2015 4th place at regional competition Jugend-Forscht, special prize "Nature"

2016 Award of the German Mathematicians' Association for "outstanding performance in mathematics"

2016 Award of the German Mathematicians' Association for "outstanding performance in mathematics"

2016 Award for "special achievements in the subject of catholic religious education" from the Faculty of Catholic Theology of the Johannes Gutenberg University Mainz

Programming languages

See attachment IT-Skills Overview

Languages

German **Mothertongue**

Hungarian **Mothertongue**

French **Fluent** *DALF C1*

Englich **Fluent**

Spanish **Basic**

Further interests

- Trekking/ Mountaineering
- Calisthenics
- Philosophy, Effective Altruism
- Cooking

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IT-skills & competencies

Assessment level:

- Basic knowledge
- Basic knowledge and personal experience in projects
- Extensive experience in projects
- In-depth expert knowledge
- Expert / guru

	Level		Experience in years	Description of use
Languages:		Wolfram Mathematica	4	Main tool in PhD project
		FORM	2	Computer algebra system, specialized on Dirac algebra and efficient RAM distribution
		LaTeX	5	Wrote Master's thesis, multiple presentations, posters, papers, and PhD thesis
		Python 3	4	University course, applications in master's and PhD project
		Kira	3	Linear Equation Solver based on Finite Fields
		Shell Scripting	3	Running jobs on computer cluster, scripts for terminal based programs (e.g. Kira), automatization of work steps related to PhD project
		Reduze 2.0	2	Generates and solves integration by parts for integrals
		Fermat	2	Optimized algorithms for specific mathemaical operations like GCD
		C	1	University course + project (simulation of solar system) PhD project (e.g. OpenLoops)
		Singular	1	Optimized algorithms for mathematical operations on polynomial rings e.g. computations of Groebner basis
		LabVIEW	1	University course, automatization of data aquisition
		HTML, XHTML & CSS	1/2	School project: Designing a website

Frameworks and libraries:		pySecDec	3	Python libery for numeric integration, PhD + master's project
		pandas	1/2	Kaggle project
		Keras, TensorFlow	1/2	Kaggle project
		numpy	3	Kaggle project + University course
		FiniteFlow	3	Mathematica libary for algebraic operations with rational expressions using finite fields, PhD + master's project
		FIRE6	3	Like Reduze 2.0 but with different algorithm
Operating systems:		Windows 10	9	Personal use
		Linux Ubuntuu (different versions)	3	Personal use + any work related tasks
Tools:				
		Git	3	Used for PhD project + master's project
		MS Outlook + Calendy	2	
Other (methods, concepts, patterns, etc.):		Analytic, problem oriented thinking	8	
		Reformulating problems	7	Reformulating problems to profit from specific strenghts of programs/libaries
		Project management	3	PhD Project, Kaggle Project, Master's project, Research project in Zurich
		Machine Learning	1/2	Applied to Kaggle competitions on gravitational wave detection + Kaggle courses