Pia Stammer

Personal information

Date of birth	September 05, 1994
Nationality	German
Marital status	married
Current position	Postdoctoral researcher at Karlsruhe Institute of Technology (KIT), current contract ends on the 30.06.2024
Career orientation	I strive for an academic career at the border of applied mathematics and medical physics with the long-term goal of obtaining a permanent position at a university. My research interests include:

- intensity modulated proton therapy
- deterministic/grid-based dose calcualtion methods
- the dynamical low rank approximation
- uncertainty quantification

Academic Career and Education

2023 **Postdoctoral researcher**, *Karlsruhe Institute of Technology*, associated with

- the research group Computational Science and Mathematical Methods,
- CRC wave phenomena (project B9: Dynamical low-rank approximation for the simulation of radiation heat waves)
- German Cancer Research Center (DKFZ) in the Department of Medical Physics in Radiation Oncology

22nd March 2023 **Defense at the KIT faculty of mathematics, Germany**, *summa cum laude (1.0)*, PhD thesis: "Uncertainty quantification and numerical methods in charged particle radiation therapy"

2019 – 2023 **Doctoral researcher**, *Karlsruhe Institute of Technology*, associated with

- the research group Computational Science and Mathematical Methods,
- Helmholtz Information & Data Science School for Health (HIDSS4Health)
- German Cancer Research Center (DKFZ) in the Department of Medical Physics in Radiation Oncology

2016 – 2019 **M.Sc. Economathematics**, *Karlsruhe Instiute of Technology*, final grade 1.3, Study Focus: Optimization, Graph Theory, Data Science, Game Theory
Master thesis: "Displacement interpolation"

2013 – 2016 **B.Sc. Economics Engineering**, *Karlsruhe Institute of Technology*, final grade 1.4, Study Focus: Mathematical Modelling and Simulation, Game Theory
Bachelor thesis: "Coordination Problems in Multiple Public Goods Games"

2013 **Abitur**, *Karolinen Gymnasium, Frankenthal, Germany*, final grade 1.2

Other professional experience

2016	**Internship**, *Social and behavioural research at the Institute for World Economy*, Kiel, Germany • Statistical Data Analysis - Participation in the Design and Execution of Laboratory Experiments - Co-writing of Policy Article - Literature Research
2014	**Internship**, *Financial grants at L-Bank, Karlsruhe, Germany* • Creation of Wiki for Work Manuals and Integration in Directory - Assessment of Credit Requests

Funding and competitions

2022	H^3 – Helmholtz Herbst Hackathon
2021	HIDSS4Health HiWi funding (40h/month for 6 months)
2020	WiDS Datathon Maastricht

Activities in the research system

Teaching

Summer semester 2022	Exercise & substitute lecturer Optimization theory
Summer semester 2021	Exercise Uncertainty quantification
Summer semester 2020	Exercise Uncertainty quantification
Winter semester 2018/2019	Tutorial Statistics II
Summer semester 2018	Tutorial Foundations of Informatics I
Winter semester 2015/2016	Tutorial Foundations of Informatics II

Volunteering & Outreach

2020 - 2022	Annual participation in Girl's day - offering interactive workshops on applied mathematics research for female high school students
2019 - 2022	Supervision of mathematical modeling projects for high school and university students during CAMMP weeks
2021	Participation in Science Week: Communicating science to the general public
2021	Participation in "Der Zauber der Daten": Visualizing complex research data using generative graphics
2020 - 2021	Mentor at CyberMentor: Supporting, advising and organizing workshops/small research projects for female students interested in STEM
2020 - 2021	HIDSS4Health doctoral researcher representative of the first cohort
2013 - 2018	Swimming instructor: Teaching adults and children how to swim and improve their technique

Coordination & Organization

April 2023	Local Organizer of the International Workshop on Moment Methods in Kinetic Theory IV
April 2023	Design & Maintenance of the CSMM group website

Supervised Theses

2023	Bachelor thesis: *Objective functions for expected value dose optimization in intensity modulated radiation therapy*, Erik Eitel

2023	Bachelor thesis: *Uncertainty-aware dose optimization in radiation therapy*, Alexander Kaschta
2022	Master thesis: *Modelisation of uncertainties for treatment planning*, Jean Radig
2021	Master thesis: *First collision source methods for radiation therapy*, Tony Peters

Conferences and workshops

Talks

February 2023	SIAM CSE 2023, Invited talk • Minisymposium: Efficient Numerical Frameworks for Kinetic And Related Models • Talk: Efficient Solution of the Linear Boltzmann Equation for Radiation Therapy Using the Dynamical Low- Rank Approximation
September 2022	GIMC SIMAI Young 2022, Invited talk • Minisymposium: Young developments on dynamical low-rank approximation. • Talk: A robust collision source method for rank adaptive dynamical low-rank approximation in radiation therapy • In: p.129 of abstract book.
July 2022	MCQMC 2022, Contributed Talk • Using importance sampling to speed up non-intrusive uncertainty quantification for Monte Carlo simulations • In: p. 205 of abstract book.
June 2021	PTCOG59 2021, Contributed Talk • Talk: Efficient uncertainty estimates in Monte Carlo dose calculation using importance re-weighting.

Posters

June 2023	PTCOG61 2023, Poster • Time and memory efficient deterministic proton dose calculations using the dynamical low-rank approximation
April 2023	MMKT 2023, Poster • Cost and memory efficient moment methods in radiation therapy and their open-source implementation
May 2022	ESTRO 2022, Poster • PO-1728 Efficient modeling and quantification of time-dependent errors in IMPT.

Proceedings

May 2022	Efficient modeling and quantification of time-dependent errors in IMPT. • In: Radiotherapy and Oncology 170 (2022), S1529–S1531. https://www.sciencedirect.com/journal/radiotherapy-and-oncology/vol/170/suppl/S1
June 2021	Efficient uncertainty estimates in Monte Carlo dose calculation using importance re-weighting. • In: International Journal of Particle Therapy, Proceedings to the 59th Annual Conference of the Particle Therapy Cooperative Group (PTCOG59 2021 Online) (Oct. 2022), p. 24. https://doi.org/10.14338/IJPT-22-PTCOG59-9.3

Previous and current collaboration partners

- Martin Frank, Steffen Schotthöfer, Jannick Wolters, Thomas Camminady (Karlsruher Institute of Technology, Germany)
- Oliver Jäkel, Niklas Wahl, Lucas Norberto Burigo (German Cancer Research Center, Heidelberg, Germany)
- Jonas Kusch, Lukas Einkemmer (University of Innsbruck, Austria)
- Tianbai Xiao (Chinese Academy of Sciences, Beijing, China)
- Bruno Dubroca, Than-ha Nguyen (University of Bordeaux, France)
- Danny Lathaouwers (TU Delft, Netherlands)

Publication Links

- ResearchGate: https://www.researchgate.net/profile/Pia-Stammer
- Google scholar: https://scholar.google.de/citations?hl=de&pli=1&user=8nEdZy0AAAAJ

Preprints

[Kus+22] Jonas Kusch, Steffen Schotthöfer, Pia Stammer, Jannick Wolters, and Tianbai Xiao. "KiT-RT: An extendable framework for radiative transfer and therapy". In: *arXiv preprint arXiv:2205.08417* (2022).

Journal Articles

[Sta+21] Pia Stammer, Lucas Burigo, Oliver Jäkel, Martin Frank, and Niklas Wahl. "Efficient Uncertainty Quantification for Monte Carlo Dose Calculations Using Importance (Re-)Weighting". In: 66.20 (Oct. 2021), p. 205003. ISSN: 0031-9155. DOI: 10.1088/1361-6560/ac287f.

[KS22]   Jonas Kusch and Pia Stammer. "A Robust Collision Source Method for Rank Adaptive Dynamical Low-Rank Approximation in Radiation Therapy". In: *ESAIM: Mathematical Modelling and Numerical Analysis* (Nov. 2022). ISSN: 2822-7840, 2804-7214. DOI: 10.1051/m2an/2022090.

[Sta+23] Pia Stammer, Lucas Burigo, Oliver Jäkel, Martin Frank, and Niklas Wahl. "Multivariate error modeling and uncertainty quantification using importance (re-)weighting for Monte Carlo simulations in particle transport". In: *Journal of Computational Physics* 473 (2023), p. 111725. ISSN: 0021-9991. DOI: https://doi.org/10.1016/j.jcp.2022.111725.

Theses

[Sta23]   Pia Stammer. "Uncertainty quantification and numerical methods in charged particle radiation therapy". doi: 10.5445/IR/1000158316. PhD thesis. 2023.

Open Source Software

TITUS

https://github.com/CSMMLab/TITUS • Project together with Jonas Kusch. • The TITUS framework offers open source solvers for time and memory efficient deterministic proton and electron dose calculations in 2D/3D using GPU acceleration.

KiT-RT

https://github.com/CSMMLab/KiT-RT • Project together with Jonas Kusch, Steffen Schotthöfer, Jannick Wolters and Tianbai Xiao. • The KiT-RT (Kinetic Transport Solver for Radiation Therapy) framework is a high-performance open source platform for radiation transport. To enable problem-specific method selection, the framework provides different deterministic solver types.

matRad

https://e0404.github.io/matRad/ • Project developed and maintained within the research group Radiotherapy Optimization at the German Cancer Research Center (DKFZ). • MatRad is an open source software for radiation treatment planning of intensity-modulated photon, proton, and carbon ion therapy.

Programming Skills

- Languages: Matlab, Julia, Python, C++, Bash, LaTeX
- Frameworks: Scrum, OpenMP, Git, CI/CD-workflows, Linux, MS-office

Languages

German (native) • English (C2) • French (A2)

Further education and courses

Scientific Writing and Publishing • Wissenschaft besser visualisieren (Visualizing science better) • Communicating Science Online • Corruption prevention • Data protection