Antonin Sulc, PhD

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RESEARCH INTERESTS

Autonomous Systems (Particle Accelerators) · Computer Vision (Geometry, Light Fields) · Anomaly Detection · Physics-Informed Machine Learning · Agentic AI

TECHNICAL SKILLS

- **Core AI/ML:** Anomaly Detection, LLMs (Fine-tuning, LoRA), Computer Vision.
- **Engineering & MLOps:** Python, Docker, Git, SQL, High Performance Computing (HPC), Linux envs.
- **Specialized:** Quantum Computing (Qiskit), Geometric Vision, Physics-Informed ML.
- **Languages:** English (C1), German (B2), Czech (Native).

ACADEMIC APPOINTMENTS

Lawrence Berkeley National Lab (LBNL) **Jan 2025 – Present**
Researcher *Berkeley, USA*

- **Topic:** Agentic AI for Accelerator Controls. **PI:** Dr. Thorsten Hellert.
- Developing intelligent algorithms for autonomous accelerator operation.

Helmholtz Association (DESY/XFEL) **May 2021 – Oct 2024**
Senior Data Scientist *Hamburg, Germany*

- **Topic:** Real-time accelerator control algorithms. **PIs:** Prof. Eichler, Dr. Wilksen.
- Developed unsupervised log anomaly detection and "PACuna" (fine-tuned LLMs).
- Researching "ChatQCD" and LLM applications in High Energy Physics.

University of Haifa - Marine Imaging Lab **Mar 2020 – Aug 2020**
Visiting Researcher *Haifa, Israel*

- Developed algorithms for robust scene reconstruction and shape from refraction.

National Institute of Informatics (NII) **Oct 2018 – Mar 2019**
Visiting Researcher *Tokyo, Japan*

- Research on spectral defocus blur and depth estimation.

Vendavo Inc. **Jan 2014 – Dec 2015**
Software Engineer & Data Scientist *Prague, Czech Republic*

- Development of recommender systems for B2B pricing.

EDUCATION

University of Konstanz **2015 – 2020**
PhD in Artificial Intelligence (Computer Vision) *Germany*

- Grade: *Magna Cum Laude* (1.0) · Advisor: Prof. Dr. Bastian Goldluecke
- Focus: Inverse Lightfield Rendering, Geometry, Natural Illumination.

Czech Technical University **2008 – 2014**
MSc in Artificial Intelligence *Prague*

- Award: Nominated for IT Master Thesis of the Year 2014.

SELECTED PEER-REVIEWED PUBLICATIONS

1. **A. Sulc**, Event2Vec: A Geometric Approach to Learning Composable Representations of Event Sequences, *PMLR: Symmetry and Geometry in Neural Representations @ NeuralIPS (2025)* , 2025.
2. T. Hellert, D. Bertwistle, S. C. Leemann, **A. Sulc**, M. Venturini, Agentic AI for Multi-Stage Physics Experiments at a Large-Scale User Facility Particle Accelerator, *PRAB*
3. T. Hellert, J. Montenegro, **A. Sulc**, Agentic AI at the Advanced Light Source. *NeurIPS Workshop (ML4Physics)*, 2025.
4. **A. Sulc**, P. L.S. Connor. ChatQCD: Let Large Language Models Explore QCD. *42nd ICHEP*, 2024.
5. **A. Sulc**, T. Hellert, et al. Towards Agentic AI on Particle Accelerators. *NeurIPS Workshop (ML4Physics)*, 2024.
6. **A. Sulc**, et al. PACuna: Automated Fine-Tuning of Language Models for Particle Accelerators. *NeurIPS Workshop*, 2023.
7. **A. Sulc**, et al. Towards Monocular Shape from Refraction. *BMVC*, 2021 (**Oral**).
8. S. Ishihara, **A. Sulc**, I. Sato. Depth from Spectral Defocus Blur. *ICIP*, 2019.
9. **A. Sulc**, et al. Inverse Lightfield Rendering. *EMMCVPR*, 2017.
10. O. Johannsen, **A. Sulc**, B. Goldluecke. What Sparse Light Field Coding Reveals About Scene Structure. *CVPR*, 2016.

SERVICE & LEADERSHIP

- **Program Chair:** Foundations of Agentic Systems Theory (FAST) @ AAAI 2025.
- **Scientific Chair:** ICFA Beam Dynamics Mini-Workshop on ML for Particle Accelerators.
- **Reviewer:** CVPR, NeurIPS (2023-2025), BMVC.