Axel Ekman

Curriculum Vitae

Personal Profile

Accomplished research scientist with extensive experience in imaging, image processing, and volumetric data analysis. With a PhD in Physics from the University of Jyväskylä, I develop computational tools for scientific imaging, particularly in X-ray tomography. My work focuses on automated image processing pipelines and integrating machine learning to enhance microscopy and tomography analysis. I specialize in image processing, reconstruction, and analysis for large-scale volumetric datasets.

Technical skills

Programming	**Python 3**, **C++**, C, MatLab, Java, MPI, OpenCL
Image Processing	**NumPy**, std::vector, ImageJ
Machine Learning	**PyTorch**, scikit-learn, XGBoost, TensorFlow
Technical reporting	LaTeX, reveal.js

Experience

2021–   **Independent Researcher**, *Rakta Network Oy*, Finland
- Offer consulting and software development services for mathematical and scientific applications, specializing in imaging, image processing, and analysis for large-scale volumetric data.

2018–2021   **Research Scientist**, *University of California*, San Francisco
- Provided computational support for internal and collaborative research projects at the National Center for X-ray Tomography.
- Maintained and developed the automated image processing pipeline.
- Integrated modern machine learning techniques into soft X-ray tomography

2016–2018   **Postdoctoral Scholar**, *University of California*, San Francisco
- Managed the image processing pipeline at the National Center for X-ray Tomography
- Worked on transforming raw images into final volumetric representations for both fluorescence and X-ray microscopes, ensuring high-quality results for scientific analysis.
- Developed and integrated a fully automatic alignment procedure into the image processing pipeline, reducing the time from acquisition to visualization from approximately 30 hours to 5 minutes.

2011–2016   **Doctoral Student**, *University of Jyväskylä*, Finland
- Conducted extensive theoretical and numerical research on random deposition networks, focusing on the impact of steric hindrance (physical obstruction) between constituents.
- Demonstrated that steric hindrance significantly influences the contact formation and statistical properties of these networks, even in dilute systems.
- Advanced the understanding of how physical obstructions impact the connectivity and formation of contacts in random fiber networks.

2010–2011   **Research associate**, *University of Jyväskylä*, Finland
- Utilized micro- and nano-scale X-ray CT to analyze paper and cardboard structures.
- Developed and implemented quantitative analysis tools for 3D tomographic images.
- Enhanced material characterization techniques through multidisciplinary collaboration.

Education

March 2016	**Doctor of Philosophy in Physics**, *University of Jyväskylä*
April 2011	**Master of Science in Physics**, *University of Jyväskylä*
April 2011	**Bachelor of Science in Physics**, *University of Jyväskylä*

Languages (CEFR)

Swedish	Native (C2)	Finnish	Native (C2)
English	Advanced (C1)	German	Elementary (A2)

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Publications: www.researchgate.net/profile/Axel_Ekman