

Kai Zheng

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<https://kai-zheng-website.netlify.app>

SKILLS

- *Programming*: Python, C++, C, CUDA, Data Structure, Parallel Programming, Numerical Methods, GitHub, Linux
- *Computer graphics*: Rendering Pipeline, Physics-based Simulation, Computational Geometry
- *Deep Learning*: Computer Vision, 3D Face Reconstruction, 3D Face Generation, NLP, Pytorch, Tensorflow, Jax
- *Statistics*: Statistical Learning, Stochastic Processes, Time-series Analysis, Advanced Data Analysis
- *Graphics API & Game engine*: WebGL, OpenGL, Unreal Engine

EDUCATION

Doctor of Philosophy in Physics with a focus on Particle Collider Experiment **Jan 2019 – May 2024**

University of Illinois—Urbana-Champaign (Illinois) | GPA: 3.96/4.0

Master of Science in Statistics¹ **Jan 2020 – Dec 2022**

University of Illinois—Urbana-Champaign (Illinois) | GPA: 4.0/4.0

Bachelor of Science in Physics **Sept 2014 – July 2018**

Zhejiang University, Chu Kochen Honors College (China) / GPA: 3.92/4.0

EMPLOYMENT & RESEARCH EXPERIENCE

Data Analysis Researcher and C++ Software Developer **Mar 2020 – May 2024**

UIUC(Illinois) & CERN, The Large Hadron Collider (Geneva, Switzerland)

- Use big data visualization and statistical analysis to explore new fundamental particle or interactions.
- Use machine learning and deep learning for particle experiment to replace classical methods
- Build software system using C++, Python, GitLab in ATLAS team collaborating with more than 5000 people

Deep Learning Researcher for Quantum Chemistry **Apr 2021 – Sept 2021**

TikTok, AI Lab (Beijing, China)

- Studied quantum Monte Carlo simulation results using deep learning with Pytorch and Jax based on [Ferminet](#)
- Implemented contrastive divergence learning on Diffusion Monte Carlo quantum simulation

Student Researcher **Sept 2017 – Dec 2017**

Fermi National Accelerator Laboratory & Argonne National Laboratory (Illinois)

- Developed GPU accelerated algorithm using CUDA for data processing increasing 150% efficiency
- Performed High-Precision Measurement of Magnetic Field for Muon g-2 experiment (DOI: 10.1016/j.jmr.2021.107020)

PROJECTS

Computer Graphic Course Projects <https://github.com/zkcr0000/Computer-Graphics-Course>

- Implemented rasterizer with Blinn-Phong Model, Bump mapping, Texture, Anti-aliasing, etc. using C++
- Implemented Whitted-Style ray tracing, path tracing with Bounding Volume Hierarchy, BRDF, etc. using C++

Physics Based Animation Course Projects <https://github.com/zkcr0000/Physics-based-animation>

- Implemented physics-based animations using C# in Unity (without using build-in physics engine)
- Rigid body simulations with collision detection and response using impulse method, Shape matching
- Cloth simulation with implicit integration and Position based dynamics (PBD)
- Elastic body simulation with Finite Volume Method (FVM) and Fluid simulation with Shallow wave equation

Particle Track Reconstruction

- Implemented Hough transform to reconstruct particle track from collider detector data using C++
- Improved efficiency for Pattern recognition of Supersymmetric particles from 60% to 96%

Lepton Type Classification

- Classified particle types based on Recurrent Neural Network and Tree Model for sequential data
- Cleaned and visualized Experimental Collision data (20G+) with outlier using ROOT and Python Matplotlib

¹ Fulfill all course requirements on transcript, due to department restriction no degree will be offered.