

Siddharth Sule

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Final-year PhD student specialising in Monte Carlo simulation and high-performance scientific computing, with experience in mathematical modelling, GPU acceleration, and software development. Seeking research-focused roles in particle physics and HPC, and open to opportunities in quantitative finance.

Education

PhD in Particle Physics

Sep 2022 – Present

The University of Manchester

Supervised by Professor Michael H. Seymour

- Combining Monte Carlo simulation techniques with object-oriented programming to model high-energy particle collisions at the Large Hadron Collider (CERN). Contributing to the development of specialised simulation software, known as *event generators*, which provide predictions for experimental data.
- Serving as a junior developer for the open-source event generator *Herwig*, used worldwide in high-energy physics research for over 40 years. Specialising in simulating the radiation produced by quarks and gluons, known as a *parton shower*.

MPhys (Hons) Physics, First Class

Sep 2018 – Jun 2022

The University of Manchester

- *Integrated BSc+MSc Course*. Covered advanced statistical physics, scientific computing, and mathematical modelling, alongside core physics topics. For MPhys project, simulated the spread of infectious diseases on community network models using agent-based models and analysed the impact of different intervention strategies.

Work Experience and Projects

GAPS: a GPU-Amplified Parton Shower

Mar 2024 – Present

Head Developer and Author | *Publications below* | [gitlab:siddharthsule/gaps](https://gitlab.com/siddharthsule/gaps)

- Compute usage at CERN is predicted to surpass the available budget, with simulation being one of the most resource-intensive tasks. To address this, investigated GPU-accelerated strategies for Monte Carlo event generation.
- Redesigned the parton shower algorithm for parallelised simulation and developed a CUDA C++ event generator capable of simulating particle physics events on GPUs with throughput comparable to multi-node CPU clusters.

Improving Parton Shower Physics in Herwig 7

Sep 2023 – Present

Junior Developer and Project Lead | *Publication underway* | herwig.hepforge.org

- Future particle physics experiments demand higher precision in modelling emissions. To achieve this, integrated the newly developed PanGlobal and FHP parton shower algorithms into the Herwig event generator.
- Combined the parton showers with the Cluster Hadronisation model to produce hadron-level results, improving the theoretical reliability of event simulations.

Teaching and Assessment Experience

Associate Fellow of the Higher Education Academy (AFHEA) Jun 2021

Undergraduate Lab Demonstration Feb 2023 – Present
The University of Manchester

- Facilitated laboratory experiments for over one hundred undergraduate students, assessing understanding through viva-style interviews and marking lab reports with a detailed rubric to evaluate analysis, reasoning, and scientific writing.
- Analysed marks from over one thousand laboratory reports in Python using a linear mixed-effects model, treating experiment choice as a fixed effect and allocated marker as a random effect. Demonstrated a statistically significant dependence on allocated marker, motivating improvements in marking consistency.

Herwig Event Generator Tutorials

Terascale Monte Carlo School, DESY Hamburg Nov 2025

MCnet Summer School, University of Stirling Jun 2025

MCnet Summer School, CERN Jun 2024

Terascale Monte Carlo School, DESY Hamburg Feb 2024

- Introduced the Herwig event generator to students and PDRAs in particle physics, guiding them to simulate particle-collision events and customise physics settings with relevant analyses. Enabled attendees to compare simulated Large Hadron Collider results with experimental data.

Skills Overview

Technical Skills: Scientific research, Linux, software development (C++, CUDA), GPU/HPC programming, data analysis, Git, CMake

Professional Skills: Project leadership and management, critical thinking, adaptability, collaboration

Publications

Note: In particle physics publications, author names are arranged in alphabetical order.

An NLO-Matched Initial and Final State Parton Shower on a GPU Nov 2025

M. H. Seymour and S. Sule

Preprint: [ArXiv:2511.19633](https://arxiv.org/abs/2511.19633)

An Algorithm to Parallelise Parton Showers on a GPU Aug 2024

M. H. Seymour and S. Sule

[SciPost Physics Codebases 33](#)

References available upon request.