

Siddharth Sule PhD FHEA

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Particle physicist and recent PhD graduate specialising in Monte Carlo simulation and scientific computing, with experience in mathematical modelling, GPU acceleration, and research software development. Seeking research-focused roles in academic and industrial settings.

Education

PhD in Particle Physics

Sep 2022 – Jul 2026

The University of Manchester

- Developed *event generators*, software that combines Monte Carlo simulation with object-oriented programming to model high-energy particle collisions, providing theory predictions for experiments at CERN's Large Hadron Collider.
- Specialised in the *parton shower* component, a Markov chain algorithm that simulates the radiation produced by quarks and gluons (collectively called partons) in a particle collision.

MPhys (Hons) Physics, First Class

Sep 2018 – Jun 2022

The University of Manchester

Work Experience and Projects

Improving Parton Shower Physics in Herwig 7

Sep 2023 – Jul 2026

Project Lead | [arXiv:2605.02622](https://arxiv.org/abs/2605.02622) | herwig.hepforge.org

- Developer for *Herwig*, an open-source event generator used worldwide in particle physics research for over 40 years.
- To meet the precision demands of future experiments, integrated two improved-accuracy parton showers into Herwig. Discovered spurious effects that alter the predicted particle spectra, a systematic error the field had overlooked.
- To ready the showers for release, tuned each shower's parameters: simulated over 250 million events via HTCondor to map how each parameter change affects the predictions, then applied χ^2 statistics to find the best fit to benchmark CERN data.

GAPS: a GPU-Amplified Parton Shower

Mar 2024 – Present

Co-Author | SciPost Physics Codebases 33, 71 | [gitlab:siddharthsule/gaps](https://gitlab.com/siddharthsule/gaps)

- Simulation demands will soon outgrow CERN's CPU budget, with event generation a limiting factor for the Large Hadron Collider's next run. Demonstrated the first method to run the parton shower on GPUs, opening up hardware widespread in computing centres.
- Built GAPS, a CUDA C++ event generator implementing the parallel shower, producing one million collision events per minute on a single NVIDIA V100 GPU, the same runtime and energy consumption as a 96-core CPU.
- Won a funded CERN studentship for *GPU-accelerated KrkNLO matching with GAPS*, a project defined around the code that extended the PhD by three months.

Teaching and Assessment Experience

Undergraduate Lab Demonstration

Feb 2023 – Sep 2025

The University of Manchester

- Facilitated laboratory experiments for over 100 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 1,000 laboratory reports in Python using a linear mixed-effects model, exposing a statistically significant dependence on allocated marker, then addressed the inconsistency through the lab's quality-assurance process.
- Earned Fellowship of the Higher Education Academy (FHEA, Mar 2026) for this teaching and assessment record, a recognition that usually accompanies lecturer-level appointments.

Herwig Event Generator Tutorials

MCnet Summer School

Jun 2024, 2025, 2026

Terascale Monte Carlo School

Feb 2024, Nov 2025

- Delivered hands-on tutorials to an international audience of PhD students and postdoctoral researchers, covering collider simulation and comparison with CERN data.
- Coached attendees through a guided exercise, offering hints rather than direct answers, so each left able to run and adapt simulations independently.

Skills Overview

Technical Skills: Linux, software development (C++, CUDA, Python), GPU/HPC programming, batch systems (HTCondor, Slurm), data analysis, statistical modelling, Git, LaTeX

Professional Skills: Project leadership (GAPS, Herwig developments), teaching at international schools, scientific writing and peer-reviewed publication, cross-institution collaboration

Highlighted Publications

Particle physics publications list author names in alphabetical order.

J. Holguin, S. Plätzer, M. H. Seymour and S. Sule, *Studying the Infrared Behaviour of Improved Logarithmic Accuracy Parton Showers with Herwig*, [arXiv:2605.02622](https://arxiv.org/abs/2605.02622) (2026)

M. H. Seymour and S. Sule, *An NLO-Matched Initial and Final State Parton Shower on a GPU*, [SciPost Physics Codebases 71](https://scipost.org/physics/codebases/71) (2026)

M. H. Seymour and S. Sule, *An Algorithm to Parallelise Parton Showers on a GPU*, [SciPost Physics Codebases 33](https://scipost.org/physics/codebases/33) (2024)

For the full publication list, see <https://inspirehep.net/authors/2768399>