

Matthew Lim – Special HEP seminar – February 27, 2025
Sussex University

Precision at Scale: Towards Automated NNLO Event Generation

As the LHC enters its third phase of data-taking, the search for new physics is increasingly constrained not by the amount of data collected but by the accuracy of the theoretical simulations underpinning experimental measurements. This highlights the urgent need for precise and reliable computational tools. In this talk, I will discuss the development of state-of-the-art event generators that combine next-to-next-to-leading order (NNLO) QCD calculations with parton showers and higher order resummation. I will then examine the current limitations of these generators and explore how advances in precision, applicability, uncertainty estimation, and computational efficiency can pave a route towards automation. The ultimate aim of this programme is to maximise the impact of theoretical advancements on experimental analyses and deliver versatile, user-friendly tools for both current and future collider experiments.