Contribution ID: **20** Type: **not specified**

Learning some Physics and Maths

Wednesday 10 December 2025 11:00 (45 minutes)

In this talk, I present new results on (machine) learning of physics and mathematics. First, we report on advancements in training flow-based models to simulate quantum field theories (QFT). We advocate adopting physics-inspired generation paths and exploiting the physics information gained by learning such flows. The latter can be applied to simulate continuous families of theories in one go, and leads to novel and efficient methods to compute connected correlation functions. Second, in the domain of mathematical physics, we analyze datasets consisting of infinite q-series, which appear as QFT partition functions, topological invariants, or quantum modular forms. We introduce a data-analysis pipeline designed to represent, manipulate, and interpret this data. As concrete examples, we analyse how a classifier learns the homology groups of three-manifolds, and present evidence of unexpected relations between specific three-manifold topological invariants and cobordism invariants. The first part will be based on work done with Tobias Göbel and Mathis Gerdes, while the second based on work with Brandon Robinson, Shimal Harichurn, Fabian Ruehle, Sergei Gukov, and Rak-Kyeong Seong.

Presenter: CHENG, Miranda