Hello folks,

Here's what you might find interesting today.

Quantum and ML Methods for Collider Physics

- Robust Quantum Machine Learning for Collider Event Selection under Detector Variability -- Christopher Brown, **Michael Spannowsky**, Simon Williams

This paper investigates whether parameterised quantum models offer a useful inductive bias for robust collider-event selection when detector conditions drift from the training reference. The authors tackle two settings: unsupervised **anomaly detection** using quantum autoencoders trained on background events, and supervised SUSY-vs-background classification using quantum classifiers with data reuploading. On clean inputs, the quantum autoencoders achieve competitive anomaly-detection performance, including in the low-false-positive-rate regime relevant for triggering. The key finding is that under controlled feature-level smearing, the quantum models exhibit smaller shifts in output scores and retain discrimination more effectively than expressive classical baselines like multilayer perceptrons. This might be interesting for you, Aritra, given your interest in both **anomaly detection at the LHC** and **quantum circuit architectures** -- the robustness angle under detector variability is a practical and underexplored direction for quantum ML in HEP. The paper also motivates follow-up studies with realistic detector systematics, finite-shot statistics, and quantum-device noise, which could be a fruitful avenue. Note that **Michael Spannowsky** is among the starred authors.

That's the standout paper for today -- a relatively quiet day on the ML-for-HEP front otherwise. The hypergraph paper from hep-th (On Hypergraph Representation of Multipartite Quantum Systems) touches on hypergraph frameworks for quantum systems, but it is rooted in string theory compactifications and quantum information rather than LHC physics, so it is likely too far afield to be actionable.

Back tomorrow with more!

P.S. In the most recent submission window: hep-ph: 17 papers hep-ex: 12 papers hep-th: 31 papers