HAMLET
How to Apply Machine Learning to Experimental & Theoretical PHYSICS
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Towards an artificial muse for new ideas in Science

Wednesday 20 August 2025 09:40 (1 hour)

Artificial intelligence (AI) is a potentially disruptive tool for physics and science in general. One crucial question is how this technology can contribute at a conceptual level to help acquire new scientific understanding or inspire new surprising ideas. I will talk about how AI can be used as an artificial muse in physics, which suggests surprising and unconventional ideas and techniques that the human scientist can interpret, understand and generalize to its fullest potential.

[1] Krenn, Pollice, Guo, Aldeghi, Cervera-Lierta, Friederich, Gomes, Häse, Jinich, Nigam, Yao, Aspuru-Guzik, On scientific understanding with artificial intelligence. Nature Reviews Physics 4, 761–769 (2022).

[2] Gu, Krenn, Interesting Scientific Idea Generation Using Knowledge Graphs and LLMs: Evaluations with 100 Research Group Leaders. arXiv:2405.17044 (2024)

[3] Rodríguez, Arlt, Möckl, Krenn, Automated discovery of experimental designs in super-resolution microscopy with XLuminA. Nature Communications 15, 10658 (2024).

[4] Krenn, Drori, Adhikari, Digital Discovery of Interferometric Gravitational Wave Detectors. Physical Review X 15, 021012 (2025).

Broad physics domain

AI/ML technique(s) to be presented

Presenter: KRENN, Mario

Session Classification: Keynote