KCETA Colloquium

AI designed detectors

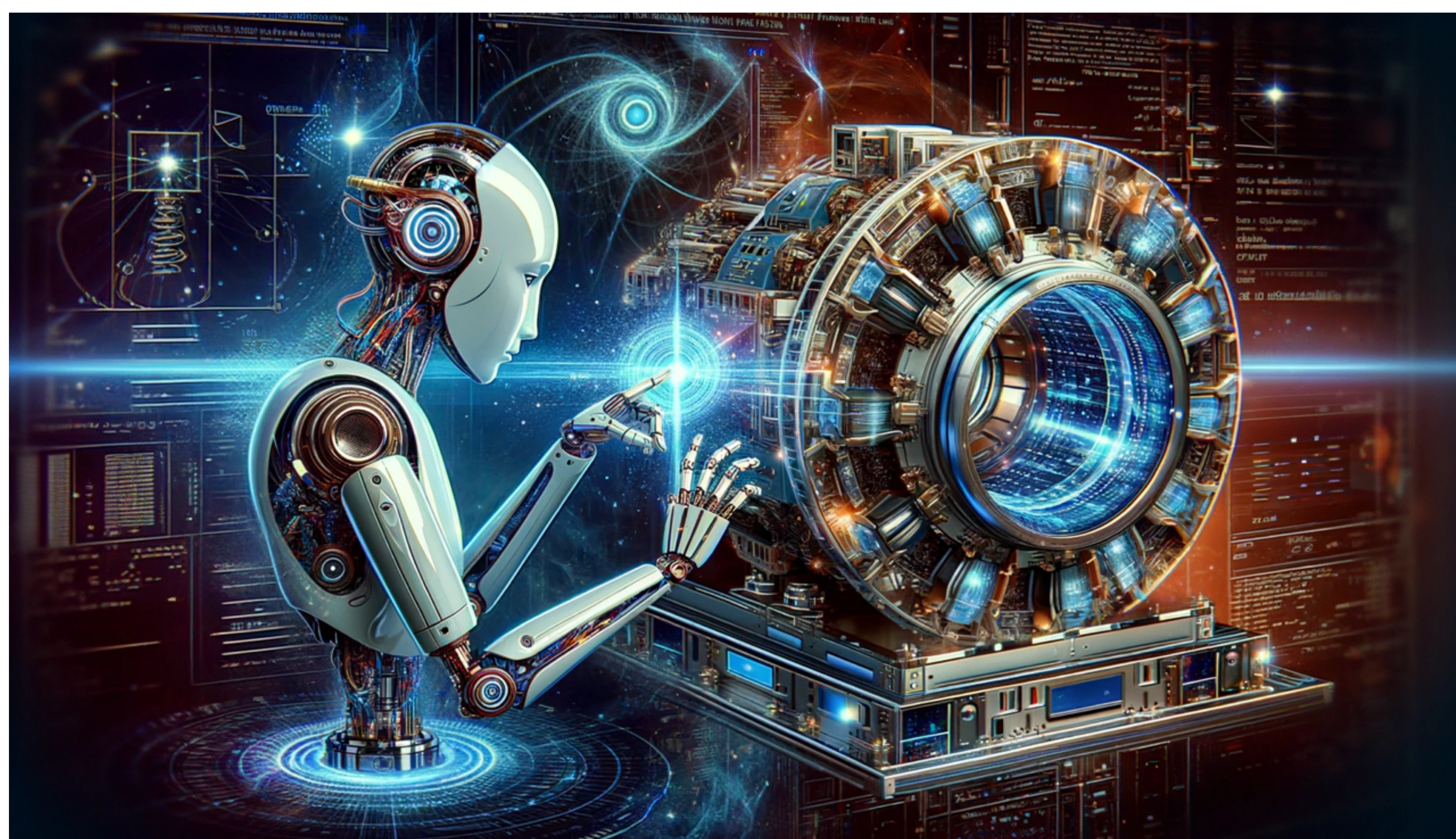**Thursday, January 11, 2024**
Kleiner Hörsaal A (CS) 15:45 - 17:00

Dr. Jan Kieseler
(Institute of Elementary Particle Physics, Karlsruhe Institute of Technology)

Our understanding of the fundamental effects in particle physics relies on confronting predictions with measurements. For those measurements, typically very complex detectors are required that come with a plethora of parameters that need to be optimised to achieve the best sensitivity to the effects that should be measured. The effective design of such instruments that rely on the interaction of radiation with matter for their operation is a very complex task for a variety of reasons.

Often, a single experiment needs to cover a plethora of physics processes and possible experimental signatures. Moreover, the interplay of different detector components, all subject to cost constraints, is highly complex and strongly intertwined with the way the data is then further analysed.

While even large scale detectors such as e.g. at the LHC are built using step-wise surrogates for the ultimate physics objectives, the rise of artificial intelligence (AI) techniques in the last decade provides new opportunities also for experimental design. These techniques themselves as well as the tools developed for them can aid an end-to-end optimisation of the design of instruments, exploring paths towards the Pareto-optimal frontier. This colloquium will cover the general idea of AI designed detectors, the challenges that come with it, with particular focus on particle physics, and highlight some of the already existing ingredients on the way to optimising even the most complex instruments.

Please note:
The colloquium will also be live-streamed to Seminarraum 410 in Bld. 401 (CN).

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