

Plenary Talk PV XIV Thu 9:45 HSZ/AUDI
Machine Learning Advances in Particle Physics — ●LUKAS
HEINRICH — Technical University of Munich

The year 2012 has been marked by two breakthroughs in science. One is very familiar to particle physicists: the discovery of the Higgs. The other would soon capture the attention of scientists and non-scientists alike: the breakthrough of deep learning which started with the “AlexNet” moment and kicked off a decade of impressive advance-

ments in a wide range of domains, including fundamental physics. However, applications in fundamental physics must go beyond black-box point prediction and typically enable a rich interpretation of the data, including robustness to systematic uncertainties, interpretability and optimization with respect to multiple possibly competing objectives. In this talk I will review recent successes in ML that proved impactful within the context of fundamental physics and discuss future directions including differentiable and probabilistic programming, foundation models and fast simulation.