

Alessandro Vicini – HEP Seminar – February 19, 2024
University of Milano and CERN

Title: Precision Physics with Elementary Particles

Abstract:

The study of the fundamental interactions known in Nature allows us to tackle several fascinating questions about the structure of our Universe. Elementary Particles experiments, at low and high energies, are collecting an impressive amount of very high-precision data, which can be used to try to find an answer to these questions.

In this presentation I will review the program of Precision Tests of the Standard Model of the strong and electroweak interactions, taking as an example the study of the properties of the electroweak gauge bosons W and Z , at the Fermilab Tevatron, at the CERN LHC, or in low-energy experiments like P2 in Mainz or Moeller at Jefferson Lab. The central role of the quantum corrections will be illustrated, explaining their impact on the prediction of the most significant physical observables and in the searches for New Physics signals.

I will illustrate the main challenges in the preparation of high precision predictions, which require state-of-the-art results from Quantum Field Theory, Advanced Mathematics, and Computational Physics.