PERugia Advanced Physics Seminars 2023

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Fabio Anulli
INFN Roma "La Sapienza"

Measurement of exclusive hadronic cross sections and implications for the anomalous magnetic moment of the muon

After more than 60 years since the first measurements, the study of e+e− annihilation processes at low energies are still a great source of information in an energy region where perturbative Quantum Chromodinamyc cannot be used. The hadronic cross section is also the experimental input for the theoretical calculation of the hadronic contribution to the anomalous magnetic moment of the muon, allowing for precise tests of the Standard Model and searches for New Physics effects.
A great improvement on the precision of hadronic cross section measurements has been obtained in the last two decades, thanks to new generation experiments at high-luminosity e+e− colliders and novel analysis methods. We present here the main results obtained on the measurement of a variety of multi-hadronic final states, with particular regard to the BABAR experiment that pioneered an analysis technique based on Initial State Radiation.
We discuss the impact of the measurements of exclusive hadronic cross sections on the muon $g-2$ calculation, including the most recent measurements of the process $e^+e^- \to \pi^+\pi^-$, and present the current status of the comparison between theory and experiment in light of the new direct measurement at the $g-2$ experiment at FermiLab and of recent lattice calculations.

Aula virtuale