Contribution ID: **625** Type: **Parallel Talk**

High precision calculations for the MUonE experiment

Friday, 8 July 2022 09:45 (15 minutes)

The anomalous magnetic moment of the muon $a_\mu = (g-2)_\mu/2$ has been measured at the Brookhaven National Laboratory in 2001 and recently at the Fermilab Muon $g-2$ Experiment. The results deviate by 4.2 σ from the Standard Model predictions, where the most dominant source of theoretical error comes from the Hadronic Leading Order (HLO) contribution $a_\mu^{\rm HLO}$. MUonE is a proposed experiment at CERN whose purpose is to provide a new and independent determination of $a_\mu^{\rm HLO}$ via elastic muon-electron scattering at low momentum transfer. To achieve a precision that is comparable to the standard *timelike* estimation of $a_\mu^{\rm HLO}$, the experiment must reach an accuracy of about 10 parts per million on the differential cross section. This requires a similar level of accuracy also from the theoretical point of view: a precise calculation of the muon-electron scattering cross section with all the relevant radiative corrections as well as quantitative estimates of all possible background processes are needed. In this talk the theoretical formulation for the NNLO photonic corrections as well as NNLO real and virtual lepton pair contributions are described and numerical results obtained with a Monte Carlo event generator are presented. These contributions are crucial to reach the precision aim of MUonE.

In-person participation

Yes

Primary authors: Dr CARLONI CALAME, Carlo M. (INFN Pavia); BUDASSI, Ettore (Università di Pavia, INFN Pavia); DEL PIO, Clara L. (University of Pavia, INFN Pavia); Prof. PICCININI, Fulvio (INFN Pavia); Prof. MONTAGNA, Guido (University of Pavia, INFN Pavia); Dr CHIESA, Mauro (University of Pavia, INFN Pavia); Prof. NICROSINI, Oreste (INFN Pavia); Dr MEHEDI HASAN, Syed (INFN Pavia)

Presenter: BUDASSI, Ettore (Università di Pavia, INFN Pavia)

Session Classification: Strong interactions and Hadron Physics

Track Classification: Strong interactions and Hadron Physics