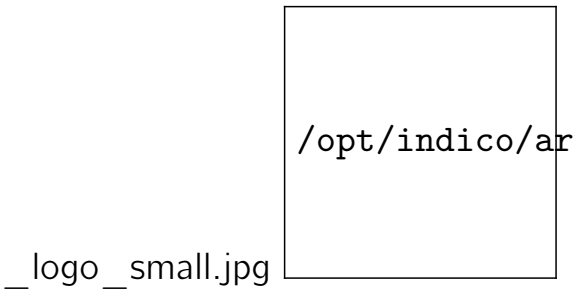

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The Mu2e crystal calorimeter

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Content

The Mu2e experiment aims to measure the charged-lepton flavour violating (CLFV) neutrino-less conversion of a negative muon into an electron in the field of a nucleus. The conversion process results in a monochromatic electron with an energy slightly below the muon rest mass (104.97 MeV). Goal of the experiment is to improve of four orders of magnitude the previous measurement with similar technique and reach a single event sensitivity of 2.5 x 10^{-17} on the conversion rate with respect to the muon capture rate.

Although the SM is very well tested in many regimes, it appears likely to be incomplete. In many of the Beyond the Standard Model (BSM) scenarios, rates for CLFV processes are within the reach of the next generation of experiments. In particular, if SUSY particles have masses and couplings within the discovery reach of the LHC, CLFV rates will be observable. On the contrary, many CLFV searches have a sensitivity to new physics that exceeds the LHC reach bringing the reach of new mass scale up to 10^4 TeV. In this contest indirected measurements of CLFV will be crucial evidence of new physics. Complementarity of Mu2e and MEG upgrade is relevant in this respect.

The experiment goal is obtained with a very intense (20 GHz) pulsed negative muon beam sent to an Aluminium target for a total number of 10ˆ{18} stopped muons in three years of running. Production and transport of the muons is done with a complicated and sophisticated magnetic systems composed by a production, a transport and a detector solenoid. The magnetic systems allows to bring this very intense beam to target with a low request on power. Description and status of the magnetic system will be reported.

The improvement with respect to previous conversion experiments is based on four elements: the muon intensity, the beam structure layout, the extinction of out of time particles and the precise electron identification in the detector solenoid. The conversion electron will be reconstructed and separated by the Decay in Orbit (DIO) background by a very high resolution (120 keV) tracking system based on straw technology. The crystal calorimeter system will confirm that the candidates are indeed electrons by performing a powerful mu/e rejection while granting a tracking independent HLT filter. A Cosmic Ray Veto system surrounds the detector solenoid and contributes to make the cosmic based background negligible.

The Mu2e experiment is under design and construction at the Muon Campus of Fermilab and has obtained CD-3 approval in July 2016. In the current schedule, the experiment start is foreseen for the end of 2019 with 3 years of running from 2020 to 2022. A second phase with a x 10 improvement on muon intensity is being discussed and could start after 2025 at the completion of the PIP-2 machine.

Summary

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