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Normalization of the Mu2e Charged Lepton FlavorViolation Experiment

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The Mu2e experiment will search for Beyond-the-Standard-Model, Charged Lepton Flavor Violation (CLFV) in muon capture $\mu^- + \mathrm{Al} \rightarrow e^- + \mathrm{Al}$, with a single event sensitivity surpassing the current world's best limit by 10,000 times. To report a reliable result, the number of stopped muons will be normalized to 10\% precision utilizing a combination of two γ-ray and one x-ray transitions. The first, directly proportional to the CLFV signal is the 1808.7 keV γ-ray emitted promptly in the muon capture process,
$\mu^{-1} + {}^{27}\mathrm{Al} \rightarrow V_\mu + {}^{26}\mathrm{Mg}^* + n$
${}^{26}\mathrm{Mg}^* \rightarrow {}^{26}\mathrm{Mg} + \gamma$
The second, is the 346.8 keV x-ray emitted promptly from the 2p$\rightarrow$1s muonic atomic transition in Al, from muon stops in the target. The third, is the 844 keV γ-ray from the β-decay
${}^{27}\mathrm{Mg} \rightarrow {}^{27}\mathrm{Al} + \beta^{-1} + \bar{\nu_e} + \gamma$
where ^{27}Mg is produced in the muon capture process, and decays with a lifetime of 9.5 minutes.
The stopped-muon rate measurement will use two complementary photon counting detectors. One of them, the $LaBr_3$ detector, is capable of high rate operation up to and above 800 kcps, with 0.7 % energy resolution. The other, the HPGe detector is capable of energy resolution of 0.1%, however, its rate capability is limited to an estimated $\sim$100 kcps.

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