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Atmospheric Muon Lifetime, Standard Model of Particles and the Lead Stopping Power for Muons ANGEL GUTARRA-LEON, George Mason Univ, CIOLI BARAZANDEH , WALERIAN MAJEWSKI, Northern Virginia Community College — The muon is a fundamental particles of matter. It decays into three other leptons through an exchange of the weak vector bosons W+/W-. Muons are present in the atmosphere from cosmic ray showers. By detecting the time delay between arrival of the muon and an appearance of the decay electron in our detector, we'll measure muon's lifetime at rest. From the lifetime we should be able to find the ratio gw /MW of the weak coupling constant gw (a weak analog of the electric charge) to the mass of the W-boson MW. Vacuum expectation value v of the Higg's field, which determines the masses of all particles of the Standard Model (SM), could be then calculated from our muon experiment as v=2MWc2/gw = (τmμc2/6π3$\hat{\text{h}}$)1/4mμc2 in terms of muon mass mand muon lifetime τ only. Using known experimental value for MWc2 = 80.4 GeV we'll find the weak coupling constant gw. Using the SM relation e=gwsin$\theta\sqrt{\text{hc}\varepsilon 0}$ with the experimental value of the Z0-photon weak mixing angle θ =29o we could find from our muon lifetime the value of the elementary electric charge e. We'll determine the sea-level fluxes of low-energy and high-energy cosmic muons, then we'll shield the detector with varying thicknesses of lead plates and find the energy-dependent muon stopping power in lead.

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