

Abstract Submitted  
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**Design and Implementation of a Muon Lifetime Experiment for an Undergraduate Laboratory Course** JONATHAN POWERS, MATT BOWLES, Colorado School of Mines — We have developed a simplified muon lifetime experiment, following an established design, for use in an instructional laboratory. The experiment utilizes a pot of liquid scintillator, photomultiplier tube, discriminator, time-to-amplitude converter, and PC mounted with a multichannel analyzer. Cosmic muons that decay in the scintillator produce pulse pairs, and measuring the time between pulses provides a muon decay time measurement. The lifetime is obtained by fitting the distribution of multiple measurements. An analysis of a one-week trial using the bootstrap method yielded a lifetime of  $2.10 \mu\text{s}$  with a standard deviation of  $0.115 \mu\text{s}$ . These results agree with the accepted lifetime of  $2.19 \mu\text{s}$ . Students conducted the experiment for the first time this semester, following guidelines we developed. Our achievements, detailed in the poster, are based on the ability of students to set up the experiment, analyze the data, and the accuracy of the data obtained.

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