

Abstract Submitted  
for the TSS21 Meeting of  
The American Physical Society

**A Simple Nuclear Lab for Measuring the Rest Mass of an Electron** DANIEL MARBLE, Tarleton State University — In Advanced Lab courses, students often perform nuclear counting and spectroscopy labs as well as a series of labs to measure fundamental constants including the Millikan Oil Drop and Thomson cathode ray experiments to find the charge and mass of the electron. This traditional approach has some draw backs including requiring multiple different experimental setups, long data collection times, high voltage supplies, etc. These requirements often limit the labs that smaller physics departments or high schools can perform. We have previously demonstrated that an inexpensive x-ray fluorescence lab using exempt radioactive sources and a NaI based nuclear counting system can eliminates the need for a Millikan Oil Drop setup.<sup>1</sup> In this talk, we will present a method using the same nuclear counting system for determining the rest mass of the electron. The lab is simple to perform and eliminates both the space and cost of having multiple experimental setups to measure the charge and mass of the electron. With the commercial availability of Internet accessible multichannel analyzers, it is also easy to setup remote data acquisition for students to perform this and other nuclear labs as part of a college's advanced lab course as well as high school outreach opportunities to support quantum initiatives. <sup>1</sup> D.K. Marble, "An Inexpensive XRF Lab for Undergraduates and Other Educational Activities at Tarleton's Nuclear Laboratory", AIP Conference Proceedings 2160, 050021 (2019).

Daniel Marble  
Tarleton State University

Date submitted: 15 Mar 2021

Electronic form version 1.4