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Mössbauer Spectroscopy in the Undergraduate Laboratory[1]
ADAM DECARIA, SPENCER HATCH, COLIN INGLEFIELD, Weber State University — A Mössbauer spectrometer has been built primarily from materials that are already available in the physics department at Weber State University. These materials are either common to undergraduate labs or accessible to a small budget, making reproduction at other establishments very feasible. The spectrometer is designed to illustrate and facilitate understanding of physics principles associated with Mössbauer spectroscopy, such as Doppler broadening, isomer shift, recoilless gamma ray emission, and resonant absorption. Ultimately the spectrometer will be incorporated into a junior-level physics laboratory course for physics majors. In practice, the lab work is based around the 14.4 keV gamma ray emitted by Co-57 common to Mössbauer spectroscopy. In addition to serving as an undergraduate teaching laboratory, design improvements in the near future will enable meaningful undergraduate research to be carried out. As a proof of principle, we present a preliminary Mössbauer spectrum and a measurement of the isomer shift in a stainless steel sample.

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