

Abstract Submitted
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Construction and design of an apparatus to study the Z-dependence of bremsstrahlung produced by 5 keV electrons incident on thick targets SEAN CZARNECKI, SCOTT WILLIAMS, ASHTON SHORT, Angelo State University — The design and construction of an apparatus to study the bremsstrahlung produced by 5 keV electrons incident on thick Al, Cu, Zn, Ag, Sn, W and Au targets is described. The purpose of the experiments is to measure the Z-dependence of bremsstrahlung for several photon energies in the range of 3 keV - 5 keV in order to determine whether or not polarizational bremsstrahlung (PB) contributes to the total bremsstrahlung spectrum in experiments involving thick, solid targets. Unlike ordinary bremsstrahlung (OB), which is emitted by a charged particle when it is accelerated in the Coulomb field of a target atom, PB (which theory predicts to have a different Z-dependence than OB) is emitted by a target atom's electrons as the Coulomb field of the incident charged particle polarizes the atom. The results of our experiments will be compared to the simulated results of the Monte Carlo code, PENELOPE, which is based on OB theory alone, and does not consider any PB contributions. If the comparison suggests that bremsstrahlung emitted in solid-target experiments includes a significant PB contribution, it means that the PENELOPE code (which is commonly used in medical physics for dosimetry) underestimates the intensity of radiation emitted by medical X-ray generators and needs to be corrected.

Sean Czarnecki
Angelo State University

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