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A Measurement of Zinc-65 Using Data from the KDK Experiment

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Zinc-65 (^{65}Zn) is a radionuclide of interest in the fields of medicine and gamma-ray spectroscopy, within which its continued use as a tracer and common calibration source necessitates increasingly-precise nuclear decay data. A ^{65}Zn dataset was obtained as part of the KDK ("potassium decay") experiment, whose apparatus consists of an inner X-ray detector and an efficient outer detector, the Modular Total Absorption Spectrometer (MTAS), to tag gamma rays. This setup allows for the discrimination of the electron-capture decays of Zn-65 to the ground (EC) and excited (EC*) states of Copper-65 using a novel technique for such a measurement, exploiting the high efficiency (>98%) of MTAS. Techniques used to obtain the ratio of EC to EC* decays ($\equiv \rho$) of ^{65}Zn are applicable to the main KDK analysis, which is making the first measurement of ρ for Potassium-40, a common background in rare-event searches such as those for dark matter. We present our current methodology and analysis procedures developed to obtain a neoteric measurement of the electron-capture decays of Zinc-65.

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