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Investigation of Voltage Configuration and Radial Dependence of Transmission Curves in PTOLEMY[1] HADAR LAZAR, J. SUERFU, C. GENTILE, C. TULLY, None — Princeton Tritium Observatory for Light, Early-Universe, Massive-Neutrino Yield (PTOLEMY) aims to directly detect relic neutrinos. This is achieved by measuring the energies of electrons produced from neutrino capture by tritium, which would lie just above the endpoint of tritium beta decay. The Magnetic Adiabatic Collimation combined with an Electrostatic filter (MAC-E filter) is a spectrometer that allows for the transmission and detection of these high-energy signal electrons while filtering the background beta electrons. Characterizing the process by which the MAC-E filter utilizes electric and magnetic fields helps determine the desired properties of the filter's configuration. The electric field is generated by nine electrode rings of adjustable voltages. A mathematical method incorporating the superposition principle is used as a guide to estimate the voltages that achieve the most favorable transmission curve. Once these values are determined, the different cut-off potentials of electrons due to magnetic field expansion are calculated. By manipulating the voltages on the electron source, the transmission curve for different source radii can be aligned. This overall process approaches the accuracy that the MAC-E filter demands in order to limit the flux of electrons on the calorimeter to those with energies that could indicate a relic neutrino signal.

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Hadar Lazar
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