

Ukrainian SBM-20 Geiger-Muller tubes are inexpensive and operate at 300-450 V, but exhibit both inconsistent sensitivities and optimal operating voltages. By creating an acceptance criterion from multiple tests on different tubes, a robust understanding of manufacturing variability and optimized operational parameters is possible. A benchtop scaler-ratemeter, a Ludlum Model 2200, capable of supplying variable voltages and displaying pulse rates forms the center of the experimental setup. The scaler-ratemeter uses C-cables capable of providing high voltage and collecting signals. A customized signal splitter-combiner box (iRad) separates those two channels. A breadboard circuit was designed to regulate the currents. The voltage passes through a 5.1 MOhm resistor to lower the current at the tube's cathode. The signal from the anode passes through a 5 kOhm resistor returning to the ratemeter. The 10 mm diameter, 105 mm long tubes were put in contact with a 185 kBq Cs-137 point source for 1 min. Measurements were made at cathode, anode, and three evenly-spaced locations between them. Each tube was tested by two individuals on different apparatuses at 390 V and 420 V. After 60 tubes were tested, both experiments exhibited convergence of sensitivity and a lognormal distribution. The sensitivity's standard deviation for 100 tubes ranged from 8% - 16%. The sensitivity near the anode and the cathode is ~10% of the maximum. At 25 mm from the center, the sensitivity is 90% of the maximum. The sensitivity at 390 V is 1% higher than at 420 V, insignificant relative to the measurement uncertainty. Three of 100 tubes fell outside one standard deviation from the average sensitivity value, 61.5cpm/kBq, which can serve as an acceptance criterion for tubes. Planned future work includes studies of optimized operating voltage, deadtime, and detailed positional response characterization.