

Measurement of the Emanation of Radon-222 from Cathode High Voltage Tubing for the LUX-ZEPLIN Dark Matter Experiment

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Popularized in science fiction as a common source of spacecraft fuel, dark matter, which composes approximately 85% of the universe's mass, remains highly elusive. The LUX-ZEPLIN (LZ) Dark Matter experiment seeks to address this "elephant in the room" by providing the first direct observation of dark matter. A primary obstacle to this endeavor is tuning out signals that can mimic that of dark matter. One such contributor to this signal mismatch is the beta decay of the daughters of Rn-222, which has traces in almost every material on the planet. To mitigate these ubiquitous false signals, the LZ experiment has declared a maximum cumulative radiation level of approximately 46 mBq. To ensure this limit, the South Dakota School of Mines and Technology (SDSM&T) has employed the Radon Emanation System (RES) to assess radiation levels over time, allowing researchers to build a background profile for the LZ experiment. A recent assay from the RES has concluded that the material from LZ's Cathode High Voltage Tubing material provides a negligible contribution radiation limit.