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The Radon Emanation Measurement System of PandaX-4T [remote]

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Radon emanated from detector materials and their decay daughters are potentially dangerous sources of rare event search experiments. In order to measure and control emanated radon for PandaX-4T detector, a radon emanation measurement system with electrostatic collection technique was designed. This system is consisting of a hemispherical copper counting chamber, a spiral cold trap and an acrylic emanation chamber. The hemispherical shape improves the collection efficiency of radon daughters to $27.75 \pm 0.01\%$, and the blank rate of copper chamber is 0.54 ± 0.09 mBq. The cold trap at the liquid nitrogen temperature enriches radon to improve the detection efficiency by factor of 20. The acrylic emanation chamber has no significant contribution to the background of the whole system. Furthermore we will polish the surfaces of the counting chamber and the emanation chamber to suppress the background.

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