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Precision measurement of the absorbed dose in heavy ion beam by superconducting transition edge sensor

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Calorimetry of the absorbed energy in heavy ion is very effective for minimizing of the uncertainty in dose rate measurement. Therefore we have been developing the precision heavy charged particle detector applying the superconducting transition edge sensor (TES) coupled to a tin absorber. In LTD 17, we reported our first experimental result, in which we succeeded to detect the helium ions at the HIMAC (Heavy Ion Medical Accelerator in Chiba) in National Institute of Radiological Sciences. However, the signal property were significantly degraded by the noise events which derived from the incident on neighboring region of the detection area or the event through the absorber. Thus, in order to reduce these noise events, we have greatly improved the experimental setup on the beam line. First a 1mm ϕ Ta collimator is introduced so that the heavy ion beam will only hit the absorber. Further, we changed the angle of the TES against the ion beam, so that the heavy ion beam which went through the absorber will never hit the superconducting bilayer. As a result, the noise during the experiment was reduced dramatically, enabling us to collect high quality data of heavy ions measured by TES.

Less than 5 years of experience since completion of Ph.D

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