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Muon Scattering Tomography of Spent Fuel Dry Storage

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In recent years, the cosmic-ray muon imaging technique has been widely used in industrial practical application, such as the nuclear reactor monitoring and the container internal scanning. However, it is restricted by the lagging imaging algorithm technology, resulting in poor image quality and time-consuming. In our study, a cosmic-ray imaging system of Gas Electron Multiplier (GEM) has been constructed with the help of Filter Back Projection (FBP) algorithm. Aiming at the dry spent fuel storage drums of Westinghouse MC-10, two different imaging algorithms are carried out. Two reasons are proposed by comparing their effects on the constructed image quality. The results demonstrate that the scattered reconstructed image is more sharply resolved than the transmitted one, and the sharpness of the edge is increased by 20%. The outline and missing part of the fuel assembly in the barrel can be clearly displayed by using this method, even if the position resolution of the gas detector is only 300 μm.

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