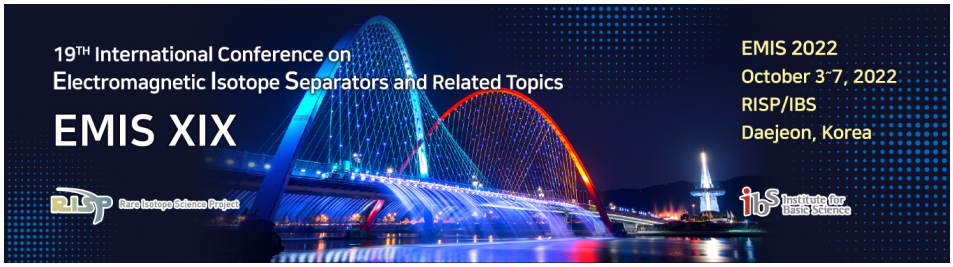

Contribution ID: **82** Type: **Poster Session**

Magnetic resonance imaging (MRI) by β-ray tracking using scintillation-fiber detectors

Tuesday, 4 October 2022 23:04 (8 minutes)

We are currently studying the nuclear physics and material science using β-NMR technique, that is to observe the nuclear magnetic resonance (NMR) by using the asymmetry of the β-ray angular distribution emitted from spin-polarized nuclei. In this research, we are developing a β-MRI technique that applies the β-NMR method to magnetic resonance imaging (MRI), which is already widely used in the medical and other fields. This new technique is expected to enable MRI using many nuclides, including carbon and oxygen, which have been unavailable by conventional MRI using nuclei. The β-MRI device to be developed will be capable of identifying the source of β-ray emission in three dimensions by tracking β-rays in two dimensions with a position detector manufactured using scintillation fibers and narrowing the z-axis size of the beam to irradiate the sample. In January 2022, we developed a position detector that counts β-rays using a MPPC (multi-pixel photon counter) with scintillation fibers aligned parallel to the beam axis and its orthogonal axis and tested its performance using a spin-polarized 12B beam at HIMAC in National Institutes for Quantum Science and Technology. As a result of the performance test, the position detectors were able to identify the trajectory of β-rays in two dimensions.

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Session Classification: Poster Session