

Assessment of shielding materials for the add-on PET prototype

Tuesday, 22 May 2018 16:15 (1h 30m)

We are developing an add-on PET system which is an MR birdcage RF-coil integrated with DOI-PET detectors. This is expected to enable realization of a high resolution, high sensitivity and low cost PET-MRI system. In the proposed system, PET detectors are extremely close to the MR RF-coil. To reduce electromagnetic interaction between the PET detectors and the MR RF-coil, the PET detectors should be covered with conductive shield boxes. However, when the magnetic field around the shield box is changed by field gradient pulses, an eddy current is generated in the shield box. In this paper, we evaluate comprehensive performance for the shield materials in terms of signal-to-noise ratio (SNR) and eddy current. The decreasing rate of SNR in the simultaneous operations with and without the power supply was measured. These results showed the decreasing rate of SNR was suppressed by 27.5% for the carbon fiber board and 32.6% for the copper foil, whereas 84.5% for the acrylic. Based on the secondary magnetic field near the shield box using copper foil, secondary magnetic field with carbon fiber board was suppressed about 47%. These results showed that carbon fiber board has higher shielding performance and suppression capacity for the eddy current though PET detectors are extremely close to the MR RF-coil.

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Session Classification: Session 8 - Poster Session I