



Contribution ID: 34

Type: **Poster Presentation**

## Development of a MPPC-based Prototype Gantry for Future MRI-PET Scanners

*Wednesday, September 10, 2014 2:00 PM (1h 40m)*

We have developed a high spatial resolution, compact Positron Emission Tomography (PET) module designed for small animals and intended for use in magnetic resonance imaging (MRI) systems. This module consists of large-area,  $4 \times 4$  ch MPPC arrays (S11827-3344MF; Hamamatsu Photonics K.K.) optically coupled with Ce-doped  $(\text{Lu,Y})_2(\text{SiO}_4)\text{O}$  (Ce:LYSO) scintillators fabricated into  $15 \times 15$  matrices of  $0.5 \times 0.5 \text{ mm}^2$  pixels. We set the temperature sensor (LM73CIMK-0; National Semiconductor Corp.) at the rear of the MPPC acceptance surface, and apply optimum voltage to maintain the gain. The eight MPPC-based PET modules and coincidence circuits were assembled into a gantry arranged in a ring 90 mm in diameter to form the MPPC-based PET system. We have developed two types PET gantry: one made of non-magnetic metal and the other made of acrylonitrile butadiene styrene (ABS) resins. The PET gantry was positioned around the RF coil of the 4.7 T MRI system. We took an image of a point  $^{22}\text{Na}$  source under fast spin echo (FSE) and gradient echo (GE), in order to measure the interference between the MPPC-based PET and MRI. The spatial resolution of PET imaging in a transaxial plane of 1 mm or less (FWHM) was achieved in all cases. Operating with PET made of ABS has no effect on MR images, while operating with PET made of non-magnetic metal has a significant detrimental effect on MR images. This paper describes our quantitative evaluations of PET images and MR images, and presents a more advanced version of the gantry for future MRI/DOI-PET systems.

**Primary author:** KUREI, Yohta (Waseda University)

**Co-authors:** KATAOKA, Jun (Waseda University); Prof. YAMAMOTO, Seiichi (Nagoya University Graduate School of Medicine); TAYA, Takanori (Waseda University); FUJITA, Takuya (Waseda University); KATO, Takuya (Waseda University); OHSHIMA, Tsubasa (Waseda University)

**Presenter:** KUREI, Yohta (Waseda University)

**Session Classification:** Session 10: Posters 1 (Particle Physics, Pixel Detectors and Lifesciences)

**Track Classification:** Applications in Life Sciences, Biology and Medicine