



Contribution ID: 156

Type: **Talk**

## Development and Performance Evaluation of a Simultaneous PET-MR Detector based on the ClearPEM Technology

*Thursday, February 14, 2013 2:00 PM (20 minutes)*

We present a feasibility study of the ClearPEM technology for simultaneous PET-MR imaging. The basic ClearPEM detector module is composed of 12 LYSO:Ce crystal matrices, each with 4x8 individual crystals (2x2x20mm<sup>3</sup>) optically coupled on both ends to S8550 hamamatsu APD arrays that are read out by two front-end boards. Each board integrates two low-noise ASICs of 192 channels each for APD readout, pulse amplification and shaping. The board also performs sequential analog-to-digital conversion and data serialization and transmission to the off-detector DAQ system.

Mutual electromagnetic interference effects between both systems were evaluated on a 7T MR scanner by characterizing the response behavior and the tolerance of the ClearPEM detectors and front-end electronics to the pulsed RF power and the switched magnetic field gradients; and by analyzing the MR system performance degradation from noise pickup into the RF receiver chain, and from magnetic susceptibility artifacts caused by PET front-end materials.

In the present work we will also present the first detection performance results of the ClearPEM module working simultaneously with a MRI acquisition; and our prototype developments on a new approach of a ClearPEM based detector for simultaneous small-animal PET-MR imaging at ultra-high magnetic fields (9.4 and 14.1T).

### quote your primary experiment

PET-MR Imaging

**Primary author:** Dr NEVES, Jorge A. (LIP - Laboratory of Instrumentation and Experimental Particle Physics, Lisbon, Portugal)

**Co-authors:** Dr MAGILL, Arthur W. (Laboratory of Functional and Metabolic Imaging, École Polytechnique Fédérale de Lausanne, Lausanne, Switzerland); Dr ORTIGÃO, Catarina (LIP - Laboratory of Instrumentation and Experimental Particle Physics, Lisbon, Portugal); Mr SILVA, José C. (LIP - Laboratory of Instrumentation and Experimental Particle Physics, Lisbon, Portugal); Prof. VARELA, João (LIP - Laboratory of Instrumentation and Experimental Particle Physics, Lisbon, Portugal); Mr BUGALHO, Ricardo (LIP - Laboratory of Instrumentation and Experimental Particle Physics, Lisbon, Portugal); Prof. GRUETTER, Rolf (Laboratory of Functional and Metabolic Imaging, École Polytechnique Fédérale de Lausanne, Lausanne, Switzerland); Mr SILVA, Rui (Laboratory of Functional and Metabolic Imaging, École Polytechnique Fédérale de Lausanne, Lausanne, Switzerland)

**Presenter:** Dr NEVES, Jorge A. (LIP - Laboratory of Instrumentation and Experimental Particle Physics, Lisbon, Portugal)

**Session Classification:** Medical Applications