



Contribution ID: 54

Type: Oral

The “Endo-TOF-PET-US” Project, A Multimodal Ultra-Sonic Probe Featuring Time-Of-Flight-Positron-Emission-Tomography in Diagnostic and Therapeutic Endoscopy

Tuesday, 22 May 2012 15:30 (20 minutes)

At first stage, the paper will briefly outline the functionality of this instrument, which aims at the development of new and higher performance imaging techniques with Time of Flight-PET capability in endoscopy and surgical oncology. The main fraction of the paper, however, will focus on the associated scientific and technological challenges to be met in fields such as scintillating crystallography, ultra-fast photodetection, highly integrated electronics, and system integration. Thereby we will highlight possible answers and solutions that derive from techniques and instrumentation prominent in high energy physics. Special emphasis is put on new developments of scintillators and diffractive optics to increase light output, and fast and compact photodetectors such as silicon photomultipliers (SiPMs) with the option of single SPAD readout. In view of the targeted coincidence time of flight performance of 200ps FWHM, equivalent to 30mm along the Line Of Response (LOR), our tests using specially doped LSO crystals together with commercial SiPMs (Hamamatsu) already produced a coincidence time resolution (CTR) of 180ps FWHM. An outlook of the future R&D until the completion of the project will be given at the end of the presentation. This project is funded by the European Commission's FP-7 Cooperation Work Program: Health 2010.1.2-1.

for the collaboration

The Endo-TOFPET-US Collaboration

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Session Classification: Applications

Track Classification: S2 - Applications