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SUJET: **The SAFIR project : Challenges of a novel detector for fast hybrid PET/MR imaging**

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RÉSUMÉ:

SAFIR (Small Animal Fast Insert for mRi) is a novel, challenging project in instrumentation for Positron Emission Tomography (PET), recently initiated at ETH Zurich, as a collaboration between the Institute for Particle Physics (IPP) and the Institute for Biomedical Engineering (IBT).

Goal of SAFIR is to design, build, and characterize an innovative high counting rate PET insert for hybrid PET/MRI of small animals. SAFIR will be designed to cope with ultra short PET scan durations, of the order of a few seconds, at a high repetition rate, and simultaneously with the magnetic resonance imaging (MRI). In the rapidly evolving scenario of PET/MRI instrumentation, the peculiarity of SAFIR relies on its excellent achievable temporal resolution, which will allow for dynamic imaging on time scales precluded so far. To compensate the statistics losses related with the acquisition duration, the PET detector will be operated at high injected activities, up to ~ 500 MBq, one order of magnitude increase in the activities normally employed in pre-clinical scanners. Severe requirements are then imposed on the detector, which must be able to cope with such a high rate of decays without suffering significantly of event losses, due either to pileup or deadtime, and without being dominated by the randoms contribution.

SAFIR relies on LYSO scintillating crystals readout by SiPM arrays. Special emphasis right now is given to the choice of the readout solution. At present, two existing ASICs, the TOFPET and the STiC chips, are being investigated, with small scale setups tested with low activity sources (in the laboratory) and with high activity phantoms (at Zurich University hospital).

The SAFIR detector concept will be described, and its status in terms of hardware characterization measurement and simulation results will be summarized.

INFORMATION : http://dpnc.unige.ch/seminaire/annonce.html
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