

The SAFIR project: Status and perspectives

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SAFIR (Small Animal Fast Insert for mRi) is a non conventional preclinical PET detector, currently under development, to be used inside the bore of a 7T MRI scanner. The goal is simultaneous PET/MR imaging of small animals, with time granularities of the order of a few seconds, for fast and dynamic quantitative analysis of different biological processes (e.g. oxygen brain perfusion) at temporal resolutions never achieved so far.

To compensate for the statistics loss due to the short acquisition duration, high activities – up to 500 MBq – have to be injected into the animals. Beside the MR-compatibility, a high sensitivity (~ 5%), a good spatial resolution (~ 2 mm FWHM), an excellent coincidence timing resolution (~ 300 ps FWHM) and a high data throughput DAQ system are required.

The SAFIR detector will rely on matrices of L(Y)SO-type crystals, one-to-one coupled to SiPM arrays, and arranged into several rings, stacked axially. Different readout options are being investigated for the SiPM readout: the TOFPET, the STiC and the PETA ASICs. High rate tests with 2 matrices of LYSO crystals coupled to SiPM arrays, readout by each one of the proposed solutions have been performed, with two modules exposed to 500 MBq of FDG tracer in ~0.5 cm³ volume and operated in coincidence.

The status and perspective of the SAFIR project will be presented, with special emphasis on the results of the high rate tests.

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