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The SAFIR readout prototype

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The aim of the SAFIR collaboration is the construction of a positron emission tomography (PET) insert for a preclinical magnetic resonance imaging (MRI) device. The device will be able to handle high source activities and the target time for one PET image acquisition is 5 s. The mechanical design is very challenging, because the inner diameter of the MRI scanner's bore limits the diameter of our insert to 200 mm.
The presented prototype consists of the same components as the full system. It fulfils the mechanical constraints, but consists of only two readout boards, each equipped with one detector module. The detector module has a matrix of 12 x 12 scintillator crystals with a pitch of 2.5 mm. We use one-to-one coupling to connect those to matching SiPM arrays. The analogue signals are digitalized with PETA6 Application Specific Integrated Circuits (ASICs) and the digital data are transmitted via an optical Ethernet link to our data acquisition computer.
In this work, we evaluate the energy resolution of the prototype. After linearisation and calibration, the singles energy resolution at the photo peak is 14.7 % full width at half maximum (FWHM).

Primary authors: Mrs ELEFTHERIOU, Afroditi (Institute for Pharmacology and Toxicology, University of Zürich, Switzerland); Mrs ZAGOZDZINSKA-BOCHENEK, Agnieszka (Institute for Particle Physics and Astrophysics, ETH Zürich, Switzerland); Prof. BUCK, Alfred (Clinic of Nuclear Medicine, University of Zürich, Switzerland); Prof. WEBER, Bruno (Institute for Pharmacology and Toxicology, University of Zürich, Switzerland); Dr TSOUMPAS, Charalampos (Leeds Institute of Cardiovascular and Metabolic Medicine, University of Leeds, United Kingdom); RITZER, Christian (Institute for Particle Physics and Astrophysics, ETH Zürich, Switzerland); Mr DI CALIFIORI, Diogo (Institute for Particle Physics and Astrophysics, ETH Zürich, Switzerland); Dr WARNOCK, Geoffrey (Institute for Pharmacology and Toxicology, University of Zürich, Switzerland); Prof. DISSERTORI, Günther (Institute for Particle Physics and Astrophysics, ETH Zürich, Switzerland); Dr SACCO, Ilarira (Institute of Computer Engineering, University Heidelberg, Germany); Dr FISCHER, Jannis (Institute for Particle Physics and Astrophysics, ETH Zürich, Switzerland); Mr KIM, Jisoo (Department of Nuclear and Quantum Engineering, KAIST, South Korea); Dr OLIVER, Josep F. (Instituto de Física Corpuscular (CSIC-UV), Universitat de València, Spain); Mr DJAMBAZOV, Lubomir (Institute for Particle Physics and Astrophysics, ETH Zürich, Switzerland); Prof. RUDIN, Markus (Institute for Biomedical Engineering, ETH Zürich, Switzerland); Dr WZSS, Matthias (Institute for Pharmacology and Toxicology, University of Zürich, Switzerland); Dr RITZERT, Michael (Institute of Computer Engineering, University Heidelberg, Germany); Dr ITO, Mikiko (Institute for Particle Physics and Astrophysics, ETH Zürich, Switzerland); Dr SOLEVI, Paola (Institute of Medical Technology, Otto-von-Guericke University Magdeburg, Germany); Mrs KHATERI, Parisa (Institute for Particle Physics and Astrophysics, ETH Zürich, Switzerland); Prof. FISCHER, Peter (Institute of Computer Engineering, University Heidelberg, Germany); Mr BECKER, Robert (Institute for Particle Physics and Astrophysics, ETH Zürich, Switzerland); Mr RÖSER, Ulf (Institute for Particle Physics and Astrophysics, ETH Zürich, Switzerland); Dr COMMICHAU, Volker (Institute for Particle Physics and Astrophysics, ETH Zürich, Switzerland); Dr LUSTERMANN, Werner (Institute for Particle Physics and Astrophysics, ETH Zürich, Switzerland)

Presenter: RITZER, Christian (Institute for Particle Physics and Astrophysics, ETH Zürich, Switzerland)

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