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A SiPM based readout system for lead tungstate crystals

In recent years Silicon Photomultipliers (SiPMs) have been proposed as a new type of readout system for scintillating detectors in many experiments. SiPMs consist of a matrix of parallel-connected silicon micro-pixels, which are independent photon counters working in limited Geiger mode with very high gain ($\sim 10^6$). This contribution presents the use of SiPMs (manufactured by FBK-irst) as the readout system of a 3×3 matrix of lead tungstate crystals. The PbWO_4 crystals have been provided by the CMS-ECAL group and are pre-production prototypes of the endcap section of the CMS electromagnetic calorimeter; they have a trapezoidal shape (with a front section of $2.86 \times 2.86 \text{ cm}^2$ and a rear one of $2.96 \times 2.96 \text{ cm}^2$) and are 22 cm long, corresponding to $24.7 X_0$. Each crystal will be readout using four SiPMs characterized by an active area of $4 \times 4 \text{ mm}^2$ and 6400 cells, hosted on the same PCB. The gain equalization and its variation with the temperature will be corrected using a LED system directly integrated on each PCB. A front-end board based on the MAROC3 ASIC will be used for the readout of the SiPMs signal. The performance of the crystal matrix in terms of linearity and energy resolution will be tested in November 2012 at CERN at the SPS-H2 and PS-T9 beamlines in the 1-150 GeV energy range.

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