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Development of the FoCal-E PAD detector and its electronics for the LHC-ALICE experiment

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In order to understand the initial state of the high-energy heavy-ion collision, it is proposed to install a forward calorimeter (FoCal) in the LHC-ALICE experiment. FoCal consists of two detectors that are an electromagnetic calorimeter (FoCal-E) to measure the direct photons and a hadron calorimeter (FoCal-H) to observe the jets. And, FoCal-E has the low-granularity silicon-pad (PAD) modules and the high-granularity silicon-pixel (MAPS) modules. Each PAD module has four pairs of a tungsten tile and the 8 x 8 silicon photodiode array, and the output signal is derived as the current sum of four photodiode cells in the same position.

The first beam test of FoCal-E was carried out at the CERN PS and SPS beam lines in 2014, and we developed the trigger signal converting circuit, the temperature monitor, the independent regulated power circuit and the isolated high-voltage generator for PAD modules. The trigger signal converting circuit is used for merging the PAD data with the MAPS data because they are working on different readout systems. The temperature monitor is connected with high-precision digital thermo-sensors through the 1-wired serial interface and it is easy to increase the number of thermo-sensors up to 160. The independent regulated power circuit and the isolated high-voltage generator had a great success to decrease the electric noise on PAD modules.

For the next beam test in 2015, we are going on with the new readout system for PAD modules.

Collaboration

The ALICE FoCal collaboration

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