**R&D for the ALICE-FoCal detector proposal – towards truly high granularity calorimeters**

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A Forward Calorimeter (FoCal) is proposed as an addition to the ALICE experiment, to be installed in the LHC Long Shutdown 3. Its main physics motivation is to provide unique constraints on the low-x gluonic structure of protons and nuclei via forward measurements of direct photons. The unique experimental challenge involved is to discriminate single photons from pairs of very close-by photons originating from $\pi^0$ decays. This will require an electromagnetic calorimeter with clean two-shower separation on the mm scale followed by a conventional hadronic calorimeter. The design choice for the electromagnetic part is that of a hybrid Si-W sampling calorimeter, using both Si-pad and Si-pixel sensors. Both are challenging technologies, where the Si-pixel based technology is key to the two-shower separation, and will have to go significantly beyond state of the art. An intensive R&D program for both Si-W based technologies is ongoing at different laboratories.

The ALICE FoCal electromagnetic calorimeter silicon sensor pads will be read out by the 72-channel HGCROC front-end (FE) ASIC by the OMEGA group, which measures the charge and the time of arrival at 40MHz frequency. Digitized signals from several FE are routed to an FPGA-based back-end (BE) system in charge of a first online data reduction. Further data processing is handled in a continuous, triggerless mode by the Common Readout Unit (CRU) PCIe40 electronics designed for the LHCb experiment, connected to the BE system via optical fibers, before final transmission to the O2 computing farm for on-line event filtering, calibration, and reconstruction. Such triggerless, FPGA-based readout architecture represents the future of readout of experiments at facilities providing extremely high-interaction rates.