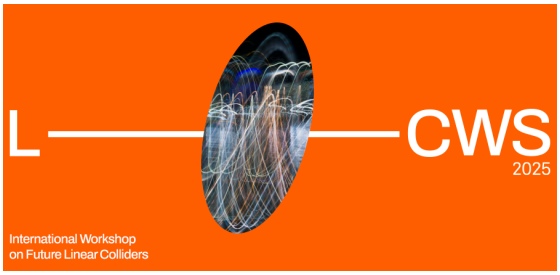

Contribution ID: **100** Type: **Talk**

Test of a partly instrumented highly compact and granular electromagnetic calorimeter in an electron beam of 1 to 6 GeV

Wednesday 22 October 2025 11:25 (17 minutes)

Highly compact and granular electromagnetic calorimeters are necessary for luminometers in experiments at electron-positron colliders or for the measurement of the positron multiplicity and energy distribution in the laser-electron scattering experiment LUXE investigating strong field QED. In the former, Bhabha scattering is used as a gauge process. Using a highly compact calorimeter, i.e. with a small Moli\'{e}re radius, the fiducial volume is well defined, and the space needed is relatively small. In addition, the measurement of the shower of a high energy electron on top of widely spread low energy background is improved. In the laser-electron scattering case, the number of secondary electrons and positrons per bunch crossing varies over a wide range, and both the determination of the number of electrons and positrons and their energy spectrum per bunch crossing favours a highly compact calorimeter.
The concept of a sandwich calorimeter made of tungsten absorber plates interspersed with thin sensor planes is developed. The sensor planes comprise a silicon pad sensor of a total area of about $90 \times 90 mm^2$, structured in 16×16 pads, flexible Kapton printed circuit planes for bias voltage supply and signal transport to the sensor edge, all embedded in a carbon fibre support.
Each sensor plane is read out by front-end (FE) ASICs called FLAME (FcalAsic for Multiplane rE}adout), positioned at the edges of the sensor. FLAME comprises an analogue FE and a 10-bit ADC in each channel, followed by a fast data serialiser.
In standard readout mode, fast deconvolution is performed in the FPGA using a procedure that.
An aluminium mechanical holds very precisely manufactured tungsten plates of about $555 \times 100 \times 3.55 mm^3$.
The current stack was instrumented with 11 plates and 11 sensor planes, each consisting of two adjacent sensors. Preliminary results on the performance will be reported.

Authors: IRLES, Adrian (IFIC Valencia); LOHMANN, Wolfgang (Deutsches Elektronen-Synchrotron (DE))

Presenter: IRLES, Adrian (IFIC Valencia)

Session Classification: Calorimetry + PID

Track Classification: Detector: Calorimetry + PID