Contribution ID: **93** Type: **Parallel session talk**

Performance of High Granularity Dual-Readout Fiber Calorimeter (HG-DREAM) with High Energy Particle Beams

Tuesday 7 October 2025 18:00 (15 minutes)

Calorimeters play a critical role in current and future high-energy physics experiments. Building on the success of earlier dual-readout calorimeter (DREAM) studies, we developed the HG-DREAM calorimeter at Texas Tech University—a highly granular dual-readout fiber detector instrumented with 896 silicon photomultipliers (SiPMs). Compared to the original DREAM module using photomultiplier tubes, HG-DREAM achieves a 24-fold increase in transverse segmentation enabled by SiPM technology. The readout system integrates CAEN FERS 5202 modules for charge integration and CAEN V1742 modules for waveform digitization, the latter operating at a 5 GHz sampling rate.

The performance of HG-DREAM is being evaluated using high-energy particle beams at the H8 beam line at CERN. The primary goals are to assess the impact of increased transverse granularity and to analyze Cherenkov and scintillation pulse shapes for improved energy and timing reconstruction. We further explore effective longitudinal segmentation via precision timing and investigate AI/ML techniques that leverage the fine shower structure for enhanced performance. While data analysis is ongoing, we present preliminary results and outline plans for future integration with a crystal-based electromagnetic calorimeter to form a unified dual-readout system.

Authors: MADRID, Christopher (Texas Tech University (US)); DAMGOV, Jordan (Texas Tech University (US)); AKCHURIN, Nural (Texas Tech University (US)); FENG, Yongbin (Texas Tech University (US))

Presenter: AKCHURIN, Nural (Texas Tech University (US))

Session Classification: RDC 9 Calorimetry

Track Classification: RDC 9 Calorimetry