Snowmass2021 - Letter of Interest

High granularity, high dynamic range Calorimeter readout electronics

Topical Group(s):
IF07 Electronics/ASICS

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The physics program at future accelerators depends in part on high granularity calorimetry. This is driven by the success of particle flow algorithms from the ATLAS and CMS collaborations, and the requirement of fully capturing multi-TeV electromagnetic and hadronic showers. New ideas in the architecture of the readout electronics for this demanding environment are needed to accommodate the granularity and dynamic range requirements.

The most stringent requirements come from the FCC-hh detector calorimeter designs. The speed, precision, high density (channel count), high-dynamic range and low-power ASICS needed for the readout do not exist in any technology. The team from UT-Austin, Columbia University, Fermilab and BNL will build on synergies with the ongoing calorimeter electronics development to investigate high dynamic range, high granularity readout electronic architectures with a focus on preamplifier/shaper and analog-to-digital converter development.

This work both develops technical expertise in instrumentation and engineering for detector design, and maintains detector design in the physics community. The team will connect with overlapping areas in the IF6 calorimeter group and the relevant EF groups in defining design requirements.