Dual-readout calorimetry

Richard Wigmans
Texas Tech University

In the last quarter century, calorimeters have evolved as the particle detectors of choice in experiments at the energy frontier. However, development of the full potential of these detectors, which are based on total absorption of the particles to be measured, is hampered by the fact that electrons and photons generated in hadron showers typically produce significantly larger signals than equally energetic protons and pions generated in the absorption process. This phenomenon, commonly referred to as *non-compensation*, is responsible for poor energy resolution, a non-linear response, and a non-Gaussian response function when detecting hadrons and jets.

Dual-Readout calorimetry offers a solution for these problems. The DREAM Collaboration is exploring the limits of the possibilities offered by this technique, by systematically eliminating the limiting factors, one after the other. Powerful tools in this context are the simultaneous measurement of scintillation light and Cherenkov light generated in the absorption process, and a detailed measurement of the time structure of the signals. As a result, calorimetric measurements of hadrons and jets with a precision level comparable to that achieved for electrons and photons now seem to be within reach.

In this talk, the latest results of this generic detector R&D project will be presented.