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Development of GRAiNITA, a next-generation calorimeter technology

Thursday, January 15, 2026 6:00 PM (20 minutes)

This presentation introduces an energy resolution study in GRAiNITA, a novel sampling calorimeter technology designed to address the high-resolution and cost-efficiency requirements of future collider experiments. The detector design features millimeter-sized $ZnWO_4$ scintillation grains distributed within a heavy liquid medium of sodium polytungstate. Scintillation light is captured by wavelength-shifting (WLS) fibers and transferred to SiPMs, a method that stochastically traps light near its creation point to offer better resolution than traditional shashlik-type calorimeters.

The talk will detail the performance characterization of a GRAiNITA prototype through beam tests conducted at the CERN SPS H9 accelerator and subsequent Geant4 simulations. By mapping the non-uniformity of light collection and its impact on energy resolution, the study establishes that the detector achieves a constant term below 0.65% and a stochastic term of approximately $1\%/\sqrt{E}$ due to secondary particle escape. These results validate the potential of GRAiNITA to provide precise measurements of neutral particles essential for flavor physics experiments at the Z^0 resonance.

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