Snowmass 2021
Instrumentation Frontier
Calorimetry

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Snowmass 2021
Instrumentation Frontier Calorimetry

- Calorimetry Requirements from Physics
- Experiments/Facilities using Calorimetry
- Technology Tools and Calorimetry Development Areas
- Performance studies

Calorimetry Requirements from Physics

Energy resolution

Energy containment

Single particles

Showers

Charged and neutral particles

Linearity

Compensation

Pileup rejection

Experiments/Facilities using Calorimetry

Colliders

- LHC/HL-LHC, FCChh,…
- Lepton Colliders – ILC, CLIC, CEPC, FCCee, …
- EIC

Neutrino experiments

- neutrinoless double-beta decay (CUORE, nEXO)
- MINOS, SuperNEMO, NovA

Low Energy Experiments

- Mu2e, EDM, rare decays

Dark Matter Search Experiments

- veto (e.g. LZ)
- future G3 concept

Experiments in Space

- AMS

Technology Tools and Calorimetry Development Areas

Sampling, homogeneous calorimeters

Materials for Calorimetry (high-Z, high-concentration, metal-doped liquid scintillator, water-based liquid scintillator, and plastics scintillator, hybrid liquid/crystal/plastics/glass, high-purity metal, etc.)

Energy detection mechanisms (Scintillation, Ionization, Cryogenic,…)

Radiation Hardness

Fast Timing

Readout systems/transducers/noise

Calibration/monitoring

Triggers/DAQ

Reconstruction algorithms

Particle Flow, Dual readout

Calorimeter Simulations

Performance studies

Electromagnetic showers

Hadron showers

Single particles

Particle ID in calorimeters (background rejection?)

Timing studies

Simulations vs calorimeter data

Hadronic and electromagnetic energy resolution

Pileup rejection