Contribution ID: **13** Type: **Poster**

CRILIN: a semi-homogeneus Crystal Calorimeter for a future Muon Collider

Wednesday, 25 May 2022 08:31 (1 minute)

The Crilin calorimeter is a semi-homogeneous calorimeter based on Lead Fluoride (PbF2) Crystals readout by surface-mount UV-extended Silicon Photomultipliers (SiPMs). It is a proposed solution for the electromagnetic calorimeter of the Muon Collider. A high granularity is required in order to distinguish signal particles from the background and to solve the substructures necessary for jet identification. Time of arrival measurements in the calorimeter could play an important role, since large occupancy due to beam-induced backgrounds is expected, and the timing could be used to assign clusters to the corresponding interaction vertex. The calorimeter energy resolution is also fundamental to measure the kinematic properties of jets. Moreover, the calorimeter should also operate in a very harsh radiation environment: 10 Mrad/year total ionizing dose (TID) and a 10^14 1MeVeq/cm^2 neutron fluence.
In June 2021, a dedicated test beam was performed at the Beam Test Facility (BTF) of the INFN-LNF with electrons. The timing resolution, evaluated as the time difference of the two SiPMs as a function of the collected energy, shows a sigma below 300 ps for deposited energy in the range 150-500 MeV. Another test beam has been performed at H2 at CERN in August 2021 with electrons of energy between 20 and 120 GeV and with 150 GeV muons. Analysis results will be shown: a timing resolution better than 100 ps has been achieved for deposited energies greater than 1 GeV. The first radiation tolerance studies and the development and tests of the small size prototype (Proto-0) are reported along with the relative results.
A bigger prototype (Proto-1), made of two layers of 3x3 PbF2 crystals each, will be realized in 2022, aiming at a temperature operation of 0/-20 degrees; this calorimeter will be qualified at a dedicated test beam at Cern before the end of 2022.

Collaboration

Muon Collider Collaboration

Primary authors: SAPUTI, Alessandro (Istituto Nazionale di Fisica Nucleare); SARRA, Ivano (Istituto Nazionale di Fisica Nucleare); Dr PAESANI, Daniele (INFN); TAGNANI, Diego (ROMA3); LUCCHESI, Donatella (Istituto Nazionale di Fisica Nucleare); DIOCIAIUTI, Eleonora (Istituto Nazionale di Fisica Nucleare); SESTINI, Lorenzo (Istituto Nazionale di Fisica Nucleare); MOULSON, Matthew David (Istituto Nazionale di Fisica Nucleare); PASTRONE, Nadia (Istituto Nazionale di Fisica Nucleare); CERAVOLO, Sergio (LNF); MARTELLOTTI, Silvia (INFN - LNF)

Presenter: Dr PAESANI, Daniele (INFN)

Session Classification: Calorimetry - Poster Session