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Applications of Very Fast Inorganic Crystal Scintillators in Future HEP Experiments

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Future HEP experiments at the energy and intensity frontiers require fast inorganic crystal scintillators with excellent radiation hardness to face the challenges of unprecedented event rate and severe radiation environment. This paper reports recent progress in application of fast inorganic scintillators for future HEP experiments, such as thin LYSO crystals for a shashlik sampling calorimeter proposed for the CMS upgrade at HL-LHC, undoped CsI crystals for the Mu2e experiment at Fermilab and a rare earth doped BaF2 crystals for Mu2e-II. Applications of very fast crystal scintillators for Gigahertz hard X-ray imaging for the proposed Marie project at LANL will also be discussed.

Summary

In high energy physics (HEP) and nuclear physics experiments, total absorption electromagnetic calorimeters (ECAL) made of inorganic crystals are known for their superb energy resolution and detection efficiency for photon and electron measurements. A crystal ECAL is thus the choice for those experiments where precision measurements of photons and electrons are crucial for their physics missions. Future HEP experiments at the energy and intensity frontiers require fast inorganic crystal scintillators with excellent radiation hardness to face the challenges of unprecedented event rate and severe radiation environment. This paper reports recent progress in application of fast inorganic scintillators for future HEP experiments, such as thin LYSO crystals for a shashlik sampling calorimeter proposed for the CMS upgrade at HL-LHC, undoped CsI crystals for the Mu2e experiment at Fermilab and a rare earth doped BaF2 crystals for Mu2e-II. Applications of very fast crystal scintillators for Gigahertz hard X-ray imaging for the proposed Marie project at LANL will also be discussed.

Primary author: Dr ZHU, Ren-Yuan (Caltech)

Presenter: Dr ZHU, Ren-Yuan (Caltech)

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