Contribution ID: **331** Type: **Poster**

Development of nanocomposite scintillators for use in high-energy physics

Thursday, 30 May 2024 15:37 (1 minute)

Semiconductor nanocrystals ("quantum dots") are light emitters with high quantum yield that are relatively easy to manufacture. There is therefore much interest in their possible application for the development of high-performance scintillators for use in high-energy physics. Nanocomposite scintillators can be obtained by casting nanocrystals into a transparent polymer matrix, to obtain materials functionally similar to conventional plastic scintillators. Since inorganic nanocrystals can potentially have O(100 ps) light decay times and O(1 MGy) radiation resistance, nanocomposite scintillators could prove to be ideal for the construction of high-performance detectors that are economical enough to be used for large-volume applications. However, few previous studies have focused on the response of these materials to high-energy particles. To evaluate the potential for the use of nanocomposite scintillators in calorimetry, we are performing side-by-side tests of fine-sampling shashlyk calorimeter prototypes with both conventional and nanocomposite scintillators using electron and minimum-ionizing particle beams, allowing the performance gains obtained from the use of NC scintillators to be directly measured.

Collaboration

Nanocal

Role of Submitter

The presenter will be selected later by the Collaboration

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Session Classification: Low Temperature, Quantum and Emerging Technologies - Poster Session

Track Classification: T9 - Low Temperature, Quantum and Emerging Technologies