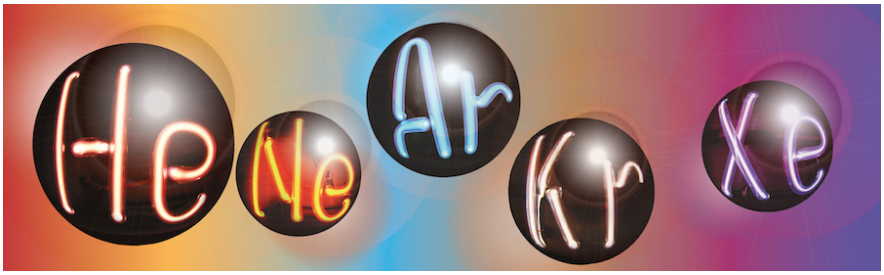

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Characterization of the DUNE photodetectors and study of the event burst phenomenon

Thursday, 16 September 2021 11:45 (15 minutes)

The Deep Underground Neutrino Experiment (DUNE) is an upcoming neutrino physics experiment that will answer some of the most compelling questions in particle physics and cosmology.
The DUNE far detectors employ silicon photomultipliers (SiPMs) to detect light produced by charged particles interacting in a large liquid argon time projection chamber (LArTPC).
The SiPMs are photosensors consisting of an array of single-photon avalanche diodes (SPAD) operating in Geiger mode. The choice of employing solid state photodetectors stems from their high sensitivity and dynamic range, as well as the possibility to fill large surfaces with high granularity.
An international consortium of research groups is currently engaged in a systematic comparison of the performances of the SiPM models that have been custom developed for DUNE by two manufacturers. Such detailed studies, which include gain measurements and a structure study of the dark count rate at 77K, are meant to determine the best choice of the photodetection system for DUNE, as well as characterize the response of the chosen detectors for the DUNE simulation. Moreover, an investigation of a newly observed phenomenon, consisting in fast bursts of events separated by a short time interval and collected in individual SiPMs, is being carried out, which potentially impacts the design of future models and their implementation in particle physics experiments. This poster presents the main results in terms of characterization of the SiPMs that will be employed in DUNE, as well as of our studies of the novel bursts phenomenon.

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