

Plastic scintillator detector with the readout based on an array of large-area SiPMs for the ND280/T2K upgrade and SHiP experiments

Tuesday, 27 November 2018 16:05 (20 minutes)

Plastic scintillator detectors are extensively used in particle physics experiments for decades. A large-scale detector is typically arranged as an array of staggered long bars which provide a fast trigger signal and/or particle identification via time-of-flight measurement. Scintillation light is collected by photosensors coupled to the both ends of every bar. In this talk we present our study on a direct replacement of commonly used photomultiplier tubes by arrays of large-area SiPMs. An SiPM array which is directly coupled to the scintillator bulk, has a clear advantage with respect to PMT: compactness, mechanical robustness, high PDE, low operation voltage, insensitivity to magnetic field, low material budget, possibility to omit light-guides. In this study arrays of eight 6 mm x 6 mm area SiPMs from HPK were coupled to the ends of a plastic scintillator bars with 1.5 m, 1.68 m and 2.3 m lengths. An 8 channel SiPM anode readout ASIC (MUSIC R1) was used for the readout, amplification and summation of signals of individual SiPMs. Timing characteristics of a large-scale detector prototype has been studied in test-beams at the CERN PS. This technology is proposed for the ToF system of the ND280/T2K upgrade at JPARC and the timing detector of the SHiP experiment at CERN SPS.

Primary authors: Dr KORZENEV, Alexander (University of Geneva (CH)); Dr BETANCOURT, Christopher (University of Zurich); BLONDEL, Alain (University of Geneva); DATWYLER, Alexander (University of Zurich); DAVID, Gascon (University of Barcelona); GOMEZ, Sergio (University of Barcelona); KHABIBULLIN, Marat (INR RAS); KUDENKO, Yury (INR RAS); Prof. MERMOD, Philippe (Geneva University); NOAH, Etam (University of Geneva); Prof. SERRA, Nicolas (University of Zurich); SGALABERNA, Davide (University of Geneva); Dr STORACI, Barbara (University of Zurich)

Presenter: Dr KORZENEV, Alexander (University of Geneva (CH))

Session Classification: Tuesday afternoon