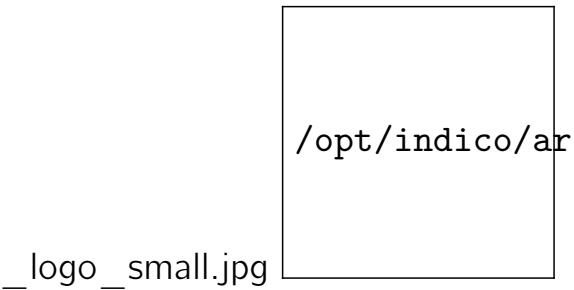

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Optimizing The Performance of V0+ Detector of the Fast Interaction Trigger (FIT) for the Upgrade of the ALICE Detector

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Content

The ALICE Collaboration is preparing a major detector upgrade for the second LHC shutdown (2019-2020). The LHC luminosity and collision rate from 2021 onwards will considerably exceed the design parameters of the present ALICE forward trigger detectors. Furthermore, the introduction of a new Muon Forward Tracker will significantly reduce the space available for the upgraded trigger detectors. To comply with these conditions a Fast Interaction Trigger (FIT) has been designed. The FIT will be the primary forward trigger and will provide minimum bias trigger, multiplicity trigger, centrality, beam-gas event rejection, collision time for the Time of Flight detector (TOF), offline multiplicity and event plane determination. The FIT detector comprises of two subdetector systems, T0+ and V0+. The T0+ consists of two arrays of quartz radiators coupled to MCP-PMT sensors facing the interaction point. The V0+ detector is composed of a disk of plastic scintillator segments, optical fiber bundles, and photosensors. In this contribution, we will focus on the V0+ detector. The V0+ detector requires high efficiency, high dynamic range (1 – 500) particles, radiation hardness and must be compatible with 25 ns bunch spacing and ˜ 1-2 MHz interaction rate for pp collisions of the new LHC operation while keeping the time resolution of about 200 ps for a single particle. In order to fulfill these technical challenges, a rigorous R&D work is ongoing. In this talk, we will present the latest status of the R&D, an optimization of scintillator material, the choice of photosensors (SiPM, Finemesh PMT, and MCP-PMT), the design of the optical fiber bundles and the readout electronics as well as an outlook.

Summary

Primary author(s) : AWADEIN, Mohamed (Stefan Meyer Institute. Austria)

Co-author(s) : ALFARO-MOLINA, R. (Instituto de Física, UNAM. Mexico City, Mexico.); FINOGEEV, D.A. (Institute for Nuclear Research of the Russian Academy of Sciences,Russia.); GRABSKI, V (nstituto de Física, UNAM. Mexico City, Mexico.); GRUBER, L (Stefan Meyer Institute. Austria); GÓMEZ-CORAL, D.M (Instituto de Física, UNAM. Mexico City, Mexico.); KAPLIN, V.A (National Research Nuclear University MEPhI, Russia.); KARAVICHEVA, T.L (nstitute for Nuclear Research of the Russian Academy of Sciences,Russia.); MAEVSKAY, A (Institute for Nuclear Research of the Russian Academy of Sciences,Russia); MELIKYAN, Yu.A (National Research Nuclear University MEPhI, Russia); SABER, G (Al-Azhar University, Physics Department, Cairo, EGY); SEREBRYAKOV,

D:V (Institute for Nuclear Research of the Russian Academy of Sciences,Russia); SŁUPECKI, M (University of Jyväskylä, Finland); SUZUKI, K (Stefan Meyer Institute.Austria); TRZASKA, W.H (University of Jyväskylä, Finland); WEBER, W (Stefan Meyer Institute.Austria); ZMESKAL, J (Stefan Meyer Institute. Austria)

Presenter(s) : AWADEIN, Mohamed (Stefan Meyer Institute. Austria)

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