The new ALICE Fast Interaction Trigger in LHC Run 3

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On the 5th of July 2022, the Large Hadron Collider (LHC) at CERN, Geneva, started the official data taking of the current LHC run, Run 3, after a maintenance, upgrade, and commissioning period of around three and a half years. ALICE (A Large Ion Collider Experiment) has undergone many upgrades and improvements \[1\], one of which is the brand-new Fast Interaction Trigger (FIT) detector \[2-4\]. With its Cherenkov and scintillating arrays, FIT detects particles from proton-proton and heavy-ion collisions in the forward regions of ALICE. It provides low-latency interaction triggers, precise interaction time, luminosity and background monitoring, and determination of centrality, multiplicity, and event plane \[5\]. Thus far, FIT has performed well in both nominal proton-proton collisions and the short Pb-Pb pilot run. FIT shows good collision time and vertex reconstruction, provides a sophisticated interaction trigger menu, and has been giving critical feedback about luminosity and background to the LHC for online beam tuning. The performance of FIT is continuously improving thanks to electronics, firmware, and software upgrades. The installation and commissioning of FIT \[6\], its performance during the start of Run 3, and future development and outlook for 2023 are presented.

\[1\] W. H. Trzaska, "New ALICE detectors for Run 3 and 4 at the CERN LHC", Nuclear Instruments and Methods in Physics Research Section A: Accelerators, Spectrometers, Detectors and Associated Equipment 958 (2020) 162116.

https://doi.org/10.1016/j.nima.2019.04.070.

\[2\] M. Slupecki, "Fast Interaction Trigger for ALICE upgrade", Nuclear Instruments and Methods in Physics Research Section A: Accelerators, Spectrometers, Detectors and Associated Equipment 1039 (2022) 167021, https://doi.org/10.1016/j.nima.2022.167021.

\[3\] M. Slupecki, "The Fast Interaction Trigger for the ALICE Upgrade", Ph.D. thesis (2020), ISBN 978-951-39-8186-0.

https://urn.fi/URN:ISBN:978-951-39-8186-0.

\[4\] D. Finogeev, "Fully integrated digital readout for the new Fast Interaction Trigger for the ALICE upgrade", Nuclear Instruments and Methods in Physics Research Section A: Accelerators, Spectrometers, Detectors and Associated Equipment 952 (2020) 161920,

https://doi.org/10.1016/j.nima.2019.02.047.

\[5\] H. M. Rytkonen, "Event plane determination with the new ALICE FIT detector", PoS ICHEP2020 (2021) 814.

https://doi.org/10.22323/1.390.0814

\[6\] W.H. Trzaska, CERN EP newsletter, 23 September 2021,

https://ep-news.web.cern.ch/content/new-alice-fast-interaction-trigger

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