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## Data-driven efficiencies of the LHCb High Level Trigger in Run 3

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Ahead of Run 3 of the LHC, the trigger of the LHCb experiment was redesigned. The L0 hardware stage present in Runs 1 and 2 was removed, with detector readout at 30 MHz passing directly into the first stage of the software-based High Level Trigger (HLT), run on GPUs. Additionally, the second stage of the upgraded HLT makes extensive use of the Turbo event model, wherein only those candidates required for a trigger decision are saved. As the LHCb detector records only events selected by the trigger system, an absolute trigger efficiency cannot be evaluated. The TISTOS method provides a solution to this by evaluating the signal trigger efficiency on a trigger-selected sub-sample independent of signal. Events can be classified as having triggered on signal (TOS), triggered independent of signal (TIS), or both (TISTOS). Efficiencies are then calculated by a tag-and-probe approach, in which TIS and TISTOS events are used as tag and probe, respectively. This approach was applied successfully in Runs 1 and 2; however, in saving only candidates required for trigger decision, all such candidates are TOS by default. The TISTOS method has thus been specified in terms of the stage of selection below each stage of interest to define meaningful efficiencies. This contribution presents the development and performance of the TISTOS method for the upgraded trigger and event model, and an overview of the HLT trigger efficiencies evaluated in 2024 LHCb proton-proton collision data.

**Primary authors:** SCARABOTTO, Alessandro (Technische Universitaet Dortmund (DE)); GOODING, Jamie (Technische Universitaet Dortmund (DE)); ALBRECHT, Johannes (Technische Universitaet Dortmund (DE))

**Presenter:** GOODING, Jamie (Technische Universitaet Dortmund (DE))

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