Commissioning of the Upstream Tracker for the LHCb Upgrade I

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**LHCb and the Upstream Tracker**
- The LHCb experiment is a forward spectrometer located at the Large Hadron Collider (LHC).
- The Upstream Tracker (UT) is placed upstream of the bending magnet and is fundamental for:
  - Software trigger implementation
  - Reconstruction of $K_S$ and $\Lambda$ in Zero Suppressed (NZS) and in Zero Suppressed (ZS) mode
  - Reduction of the ghost rate

**Path to Data Taking**

**Time Alignment**
Need to align the UT hits with the bunch filling scheme of the LHC (BXID)

The ZS bank decoder provides the number of hits for each ASIC that are then fitted to the BXIDs histograms without the need of dedicated TAE runs.

UT hits scheme matches the other sub-detectors.

**Offline Calibration**
Dedicated software package (VETRA), part of the LHCb software project.

Preliminary results:
- Uniform incoherent noise in the detector
- Observed the variation of pedestals across the layer
- Noise check after pedestal subtraction
- Agreement with the early performance studies

**Firmware**
The readout of the detector is made with PCIe40 cards hosting Intel Arria 10 FPGA. UT firmware has 5 different flavours used for different detector regions having different occupancies.

Implemented to work in Non-zero-suppressed (NZS) and in Zero-suppressed (ZS) mode.

First data collected in the Global LHCb data taking during the ions run (Pb-Pb collisions) before the start of YETS 2023-2024, useful to develop offline software.

**Current Status and Next Steps**
- Detector performances measured in the commissioning phase are aligned with the ones measured in the laboratory.
- Ongoing analysing of the first commissioning data.
- First data acquisition in Global data taking of LHCb during the ion runs.
- Continuing working to guarantee stable data taking conditions.

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