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Data compression in ALICE by on-line track reconstruction and space point analysis

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High resolution detectors in high energy nuclear physics deliver a huge amount of data which is often a challenge for the data acquisition and mass storage. Lossless compression techniques on the level of the raw data can provide compression ratios up to a factor of 2. In ALICE, an effective compression factor of >5 for the Time Projection Chamber (TPC) is needed to reach an overall compression factor suited for data taking in Heavy Ion data-taking.

The ALICE High Level Trigger provides online calculation of the TPC clusters from the raw data, followed tracking, thus producing a fully reconstructed event. Storing the reconstructed cluster data in an appropriate compressed format for utilization in the off-line reconstruction allows to discard the original raw data of the TPC. In the presented solution, compression factors of 5 to 6 are achieved without any loss in the physics information of the event. By associating space points to reconstructed tracks, all relevant parameters can be transformed into a format suitable for huffman compression. In a first conservative approach, all reconstructed clusters are kept in the data. Enhanced data compression factors can be achieved by further analysis of the space point properties and discarding clusters which are irrelevant for the measured observables.

Data compression has been implemented for the ALICE TPC in 2011 for usage in the Heavy Ion data-taking. The generic implementation of the track model concept supports the application for other detectors. In this contribution the results for TPC data compression from the 2011 Heavy Ion run and studies for other detectors are presented.

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