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An event display for the Transition Radiation Detector in ALICE

Particle collider experiments generate huge volumes of complex data, and a mix of experience and tenacity is usually required to understand it at the detector and reconstruction level. Event displays provide a useful visual representation of both raw and reconstructed data that can be used to accelerate this learning process towards physics results. They are also used to verify expected behaviour, identify anomalous data, or explain important results.

The upgrade of ALICE in preparation for Run 3 of the LHC requires modifications to existing event displays, none of which specifically focus on the operation of the Transition Radiation Detector (TRD). Existing event displays also often have a steep learning curve, a high barrier to entry, or are tightly bound to a specific environment.

We present here a cross-platform, browser-based event display, focused on interactive 2-dimensional projections of collision data from ALICE. It is driven by a flexible intermediate JSON data format suitable for web-based displays, and a generic task to convert existing data acquired in previous runs to this format. The relationship between raw and reconstructed data in the TRD is illustrated through a novel pairing of raw and reconstructed data in a unified interactive view.

A formal, collaborative, user-centric design study methodology is described that was used to guide these choices. We also document the evaluation of this display by both scientists and the general public, through a series of case studies. We further document use cases for, and hindrances preventing, the adoption of event displays, and propose novel data visualisations of experimental particle physics data.

Significance

This work is a new tool, focused on visualising data from a specific detector within the ALICE experiment, that is simpler to launch, use and integrate with, opening up visual displays of collision information to a wider audience.

References

Speaker time zone

Compatible with Europe

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