ALICE @ CERN

Developed to assist **ALICE** (A Large Ion Collider Experiment) in preparing for Run 3 of the **LHC** (Large Hadron Collider), as no existing display focuses on the **TRD** (Transition Radiation Detector).

TRD Event Display

An interactive, browser-based tool to display raw and reconstructed data recorded by the TRD detector in ALICE during particle collisions at the LHC.

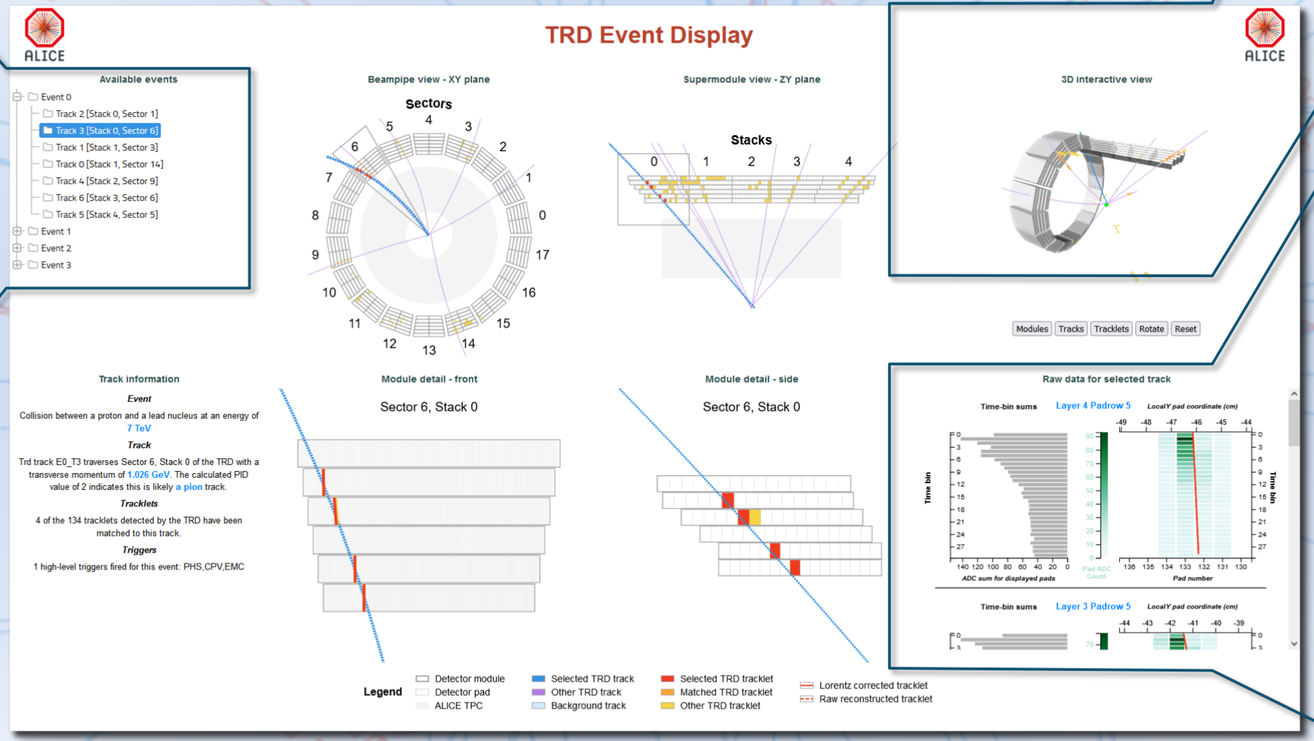
https://alicetrd.web.cern.ch/alicetrd/eventdisplay/

Outreach

Successfully demonstrated at CERN Open Days 2019, the rotatable 3-dimensional display helped visitors visualise what happens in the experiment. The display is ideal for outreach activities, as the browser-based interface can be used almost anywhere with minimal setup.

Interactive

Users are able to freely navigate between events and tracks, and all views are synchronously updated. View animations and text descriptions contextualise the changing selection.



Unified View

The relationship between raw and reconstructed data in the TRD is illustrated through a novel pairing in a unified interactive view. Signals from the TRD's gas chamber (**green**) are mapped to tracklets (**red**) which in turn are used to reconstruct tracks (**blue**).

2-dimensional projections of collision data along primary axes allow scientists to focus on visual validation of numeric data.

Implementation

The display is a static HTML file styled with CSS, that can be hosted locally. Javascript is used for interactivity and data manipulation.

2-dimensional projections are displayed using SVG and the **D3.js** library. The 3-dimensional display uses WebGL and the **three.js** library.

A C++ ROOT task converts the raw and reconstructed source data into JSON files that are loaded asynchronously.

Portable

This event display runs in any modern browser, and is even functional on mobile. It is driven by a flexible intermediate JSON data format, and is delivered as a single html file with no computational server backend.

Design Study

A formal, collaborative, user-centric design study methodology was used to design this tool. Its effectiveness was evaluated through case studies with both scientists and the public, and factors influencing the adoption of event displays discussed.

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