#### 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).

#### 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.

#### 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.

#### Collision between a proton and a lead nucleus at an energy ( Track rd track E0 T3 traverses Sector 6, Stack 0 of the TRD with a ransverse momentum of 1.026 GeV. The calculated PID value of 2 indicates this is likely a pion track.

ALICE

Event 3

Available events

Track 2 [Stack 0, Sector 1]

Track 0 [Stack 1, Sector 14]

Track 4 [Stack 2, Sector 9]

Track 6 [Stack 3, Sector 6]

Track 5 [Stack 4, Sector 5]

Track 3 Stack 0. Sector Track 1 [Stack 1, Sector 3]

Tracklets 4 of the 134 tracklets detected by the TRD have been matched to this track

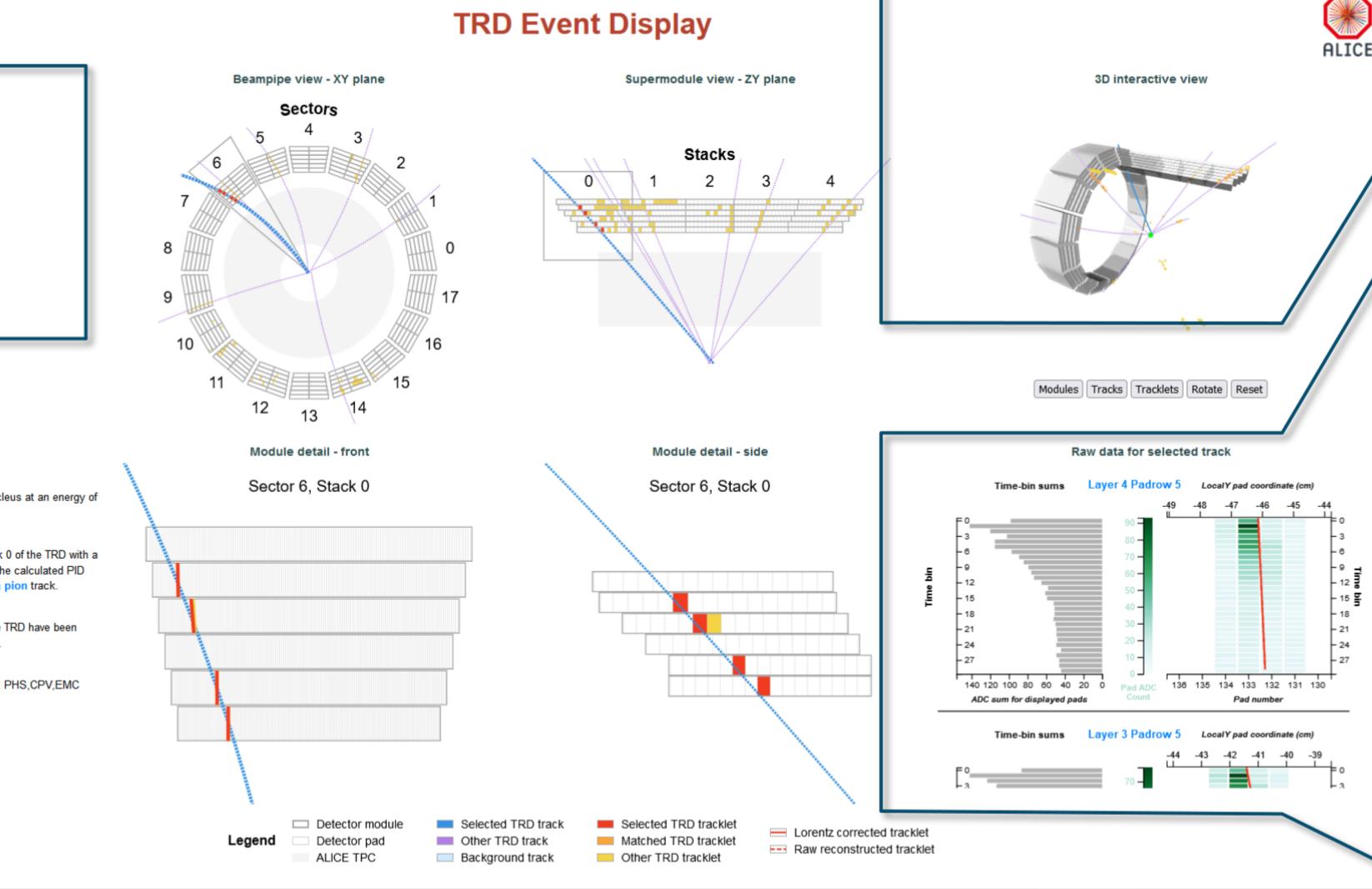
1 high-level triggers fired for this event: PHS,CPV,EMC

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.

# 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/



### Portable

#### 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.

### Outreach

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

## **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.

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