The ALICE Fast Interaction Trigger
performance and upgrade

Sahil Upadhyaya
on behalf of the ALICE collaboration
The ALICE Fast Interaction Trigger performance and upgrade | ALICE Upgrade

ALICE Upgrade

ALICE Run 3 setup

1. ZDC – Zero Degree Calorimeter
2. FDD – Forward Diffractive Detector
3. EMCal – Electromagnetic Calorimeter
4. DCal – Di-jet Calorimeter
5. HMPID – High Momentum Particle Identification Detector
6. FV0 – FVzero
7. FT0-A – FTzero A-side
8. FT0-C – FTzero C-side
9. MFT – Muon Forward Tracker
10. ITS – Inner Tracking System
11. TPC – Time Projection Chamber
12. TRD – Transition Radiation Detector
13. TOF – Time-of-Flight Detector
14. PHOS – Photon Spectrometer
15. MCH – Muon Tracking Chambers
16. MID – Muon Identifier
ALICE Upgrade

ALICE Run 3 setup

1. ZDC – Zero Degree Calorimeter
2. FDD – Forward Diffractive Detector
3. EMCal – Electromagnetic Calorimeter
4. DCal – Di-jet Calorimeter
5. HMPID – High Momentum Particle Identification Detector
6. FV0 – FVzero
7. FT0-A – FTzero A-side
8. FT0-C – FTzero C-side
9. MFT – Muon Forward Tracker
10. ITS – Inner Tracking System
11. TPC – Time Projection Chamber
12. TRD – Transition Radiation Detector
13. TOF – Time-of-Flight Detector
14. PHOS – Photon Spectrometer
15. MCH – Muon Tracking Chambers
16. MID – Muon Identifier
ALICE Fast Interaction Trigger (FIT)

- Extensive trigger menu (minimum-bias and centrality-based triggers)
- Collision rate monitoring and online luminosity feedback to the LHC
- LHC beam induced background monitoring

### Characteristics

**FT0**
- Cherenkov arrays (total 208 pixels)
- Minimum-bias and centrality trigger generation
- Collision time and vertex position calculations.
- Excellent time resolution.

**FV0**
- 48 plastic scintillator cells
- Large acceptance – 144 cm diameter
- Event centrality determination

**FDD**
- Forward Diffractive Detector
- Plastic scintillator arrays (total 16 pixels)
- Diffractive and ultra-peripheral events tagging

### Detector Parameters

<table>
<thead>
<tr>
<th>Detector</th>
<th>( \eta_{\text{min}} )</th>
<th>( \eta_{\text{max}} )</th>
</tr>
</thead>
<tbody>
<tr>
<td>FDD-A</td>
<td>4.8</td>
<td>6.3</td>
</tr>
<tr>
<td>FT0-A</td>
<td>3.5</td>
<td>4.9</td>
</tr>
<tr>
<td>FV0</td>
<td>2.2</td>
<td>5.0</td>
</tr>
<tr>
<td>FT0-C</td>
<td>-3.3</td>
<td>-2.1</td>
</tr>
<tr>
<td>FDD-C</td>
<td>-7.0</td>
<td>-4.9</td>
</tr>
</tbody>
</table>
FIT Performance

**FT0 time resolution in pp 13.6 TeV**

![FT0 time resolution](image1)

Primary vertex vs. FT0 vertex in Pb-Pb 5.36 TeV

![Primary vertex](image2)

**FV0 charge vs FT0C charge in Pb-Pb collisions at 5.36 TeV**

![FV0 vs FT0C](image3)

FV0 - 4 ADC channels/MIP
FT0 - 14 ADC channels/MIP

**FT0 collision time vs FT0 vertex in Pb-Pb 5.36 TeV**

![FT0 collision time](image4)
The ALICE Fast Interaction Trigger performance and upgrade | FIT Upgrade

**FIT Upgrade**

Current FIT FEE (based on FT0)

Upgrade plans for Run 4
- Replacement of analog with digital electronics based on FPGA and RFSoC
- Increase ADC dynamic range for charge measurements.
- Online tagging of pileup events
Thank You!
Köszönöm!

References

[1] M. Slupecki, NIMA 1039 (2022) 167021

Acknowledgement

Supported by Polish Ministry of Education and Science Grant - DIR-WSIB.92.11.2023