ALICE TOF (and AIDAinnova)

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On behalf of ALICE-TOF
and AIDAinnova (WP7: Gaseous Detectors; Task 7.2.1. MRPCs for fast timing)

East Area T9/T10 Users Meeting Thursday 17 March 2022
ALICE Time of Flight

It measures the time of flight (from the point of generation to the point of detection) of charged particles with a precision of 70 ps.

Time and trajectory length (known from tracking detectors) give the particle velocity.

From the tracking detectors we find the trajectory, thus the curvature of the track and therefore the momentum.

Momentum and velocity give us the mass, which identifies a particle uniquely.

Glass plates: 400 microns thick
Gap width: 250 microns
Gas mixture: 93%
C2F4H2(R134a) 7%
SF6

Multigap Resistive Plate Chamber
The goal

Tests of the performance of few new MRPCs
(small prototypes of about 20cmx20cm and a weight of about 2.5 kg each)
With different configurations of number of gaps and gap width

with 2 different gas mixtures:

1) the standard mixture: 93% C2F4H2 (R134a) and 7% SF6 as baseline
2) ecological gas: R1234ze (Eco-Freon in a mixture with the SF6)
→ in both cases, optimal flow: 5l/h (minimum flow: 2l/h)

Mechanical structure to contain the MRPCs
Beam Requirements @ PS (East Hall)

<table>
<thead>
<tr>
<th>Particle type</th>
<th>Polarity</th>
<th>Momentum</th>
<th>Intensity</th>
<th>Beam Size</th>
<th>Target</th>
</tr>
</thead>
<tbody>
<tr>
<td>hadrons</td>
<td>negative</td>
<td>max</td>
<td>max</td>
<td>focus 2cmx2cm</td>
<td>hadron</td>
</tr>
</tbody>
</table>

Infrastructure Requirements

Requirement @ T10:
movable table (with max 3 chambers) to center the beam spot more easily and to scan in different points of the chamber.

Requirement concerning gas: Add another line for R1234ZE