
Overview of the Barrel DIRC beam time at GSI Jul 3 – Jul 16 2014 Aug 19 – Sep 12

- Beamtime together with HADES
- 10 % of each HADES shift belong to us
- 1 – 2 hours every day in blockmode

Goals

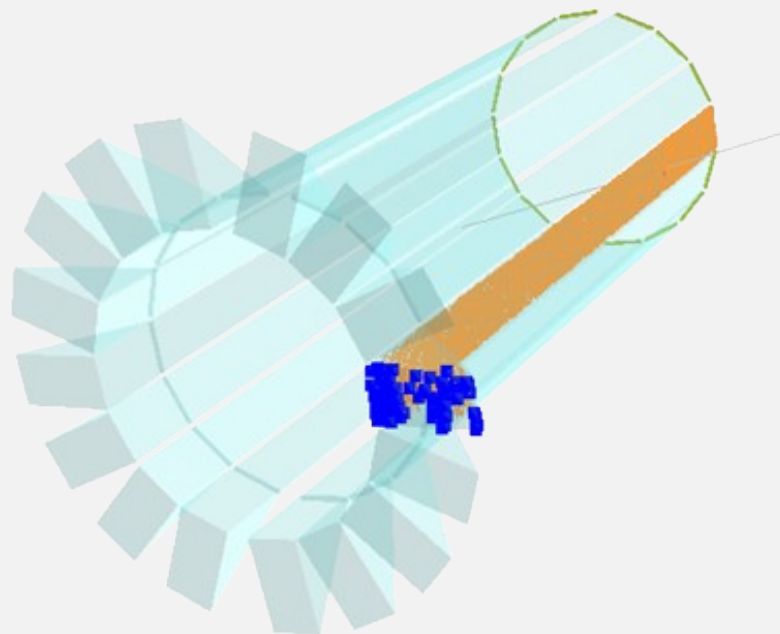
A PID with plates has been developed which works fine in simulation.

But do the 'ring' patterns in real life look the same?

What about timing?

In 2012 we had a time resolution of $\sim 250\text{ps}$

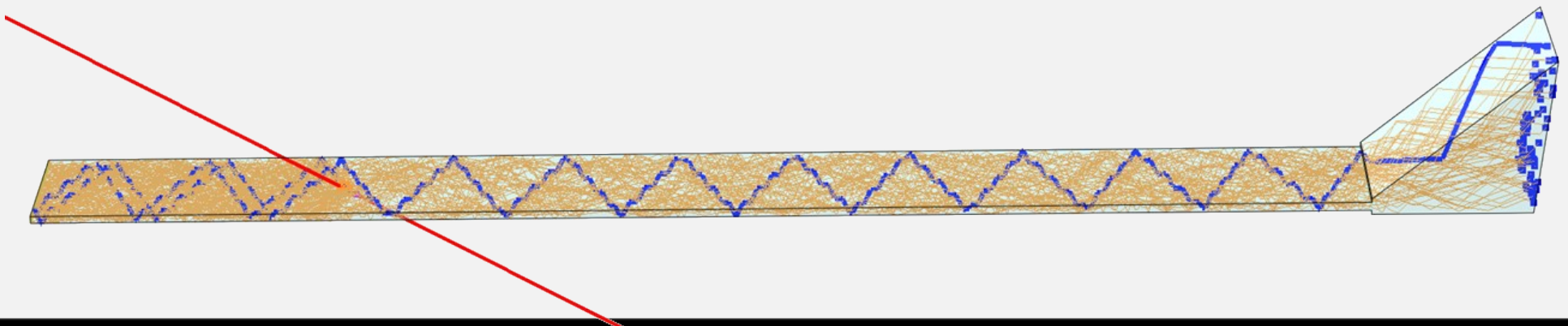
Can we improve this?



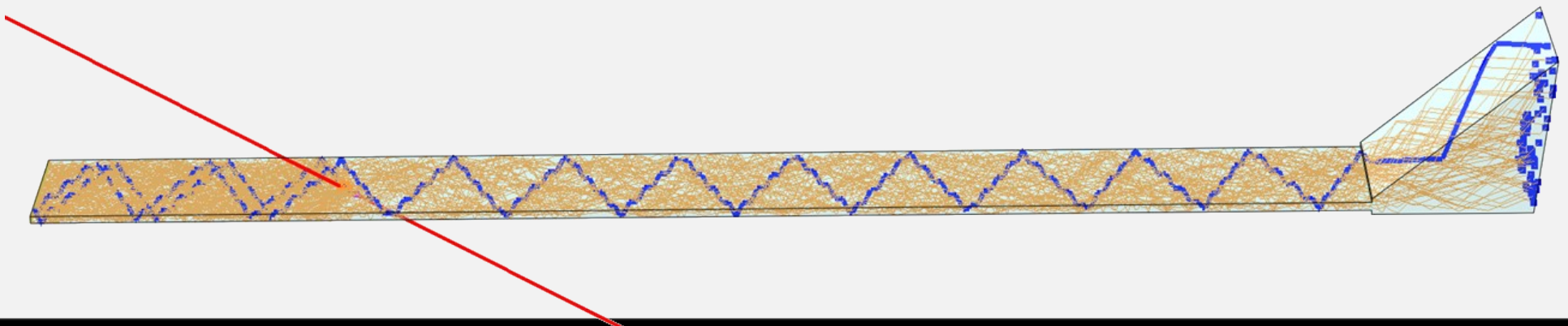
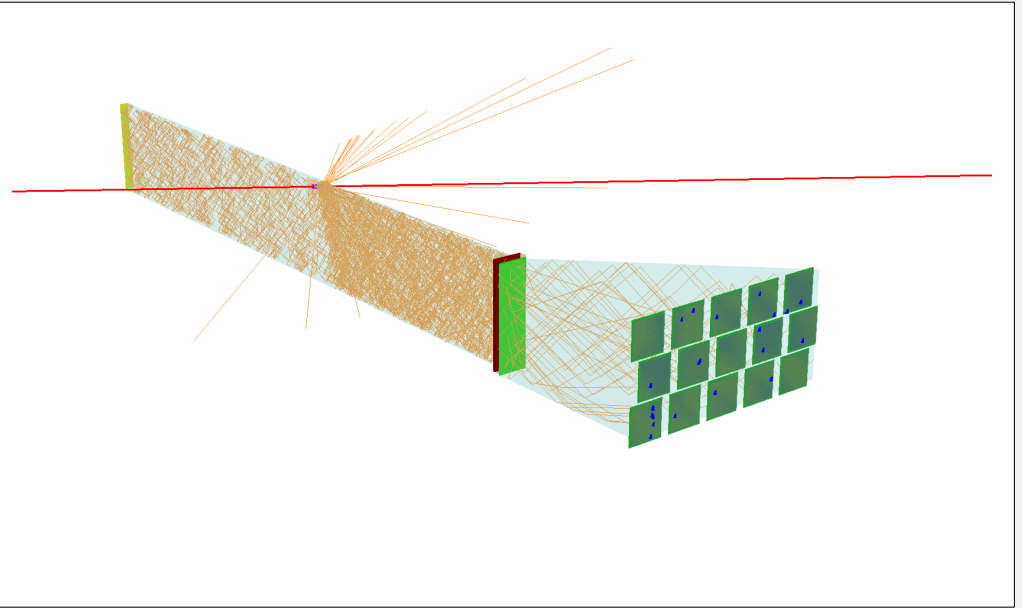
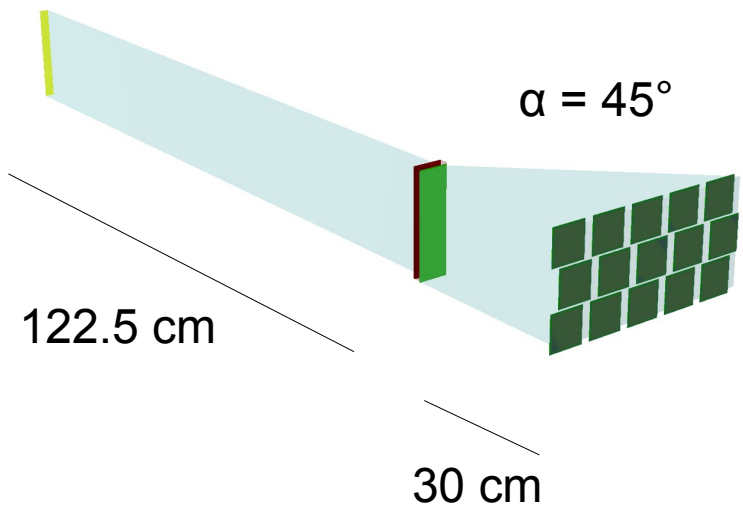
Design option

- inspired by BaBar & Belle II DIRCs
- 1 wide plate in each segment
- 16 separated compact fused silica expansion volumes
- with lens focusing and without

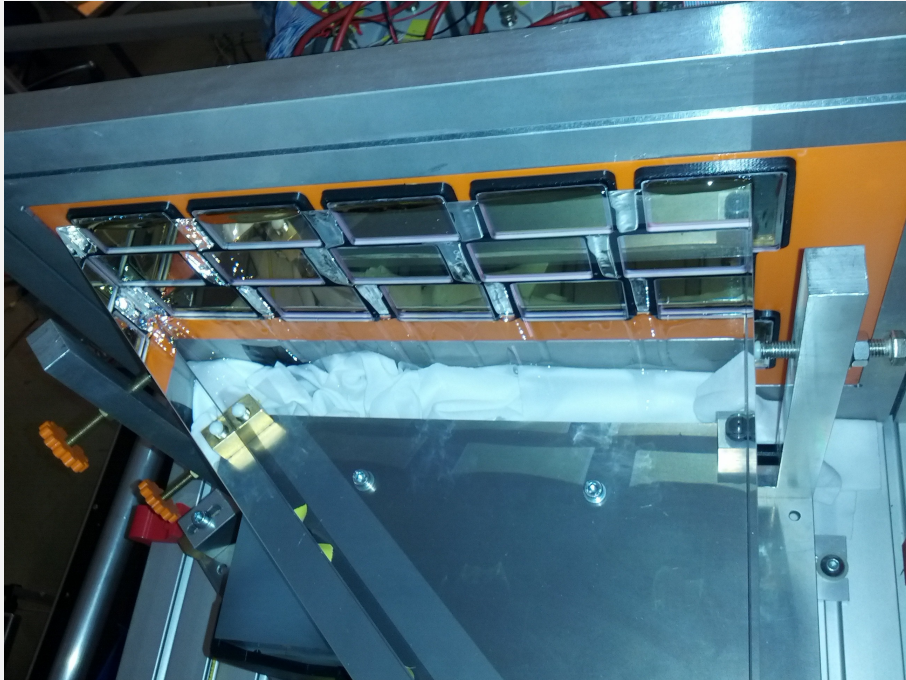
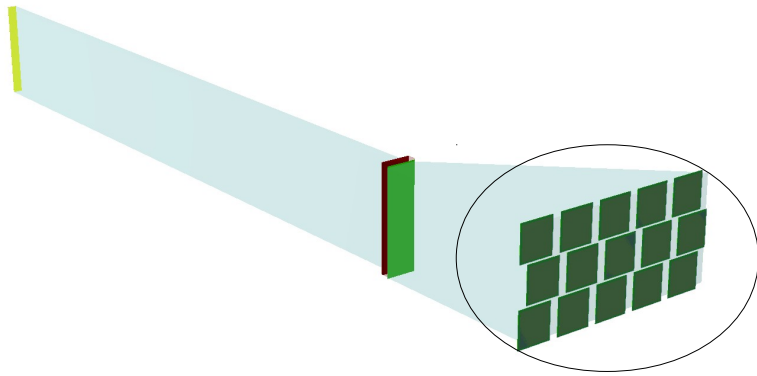
Setup



Setup

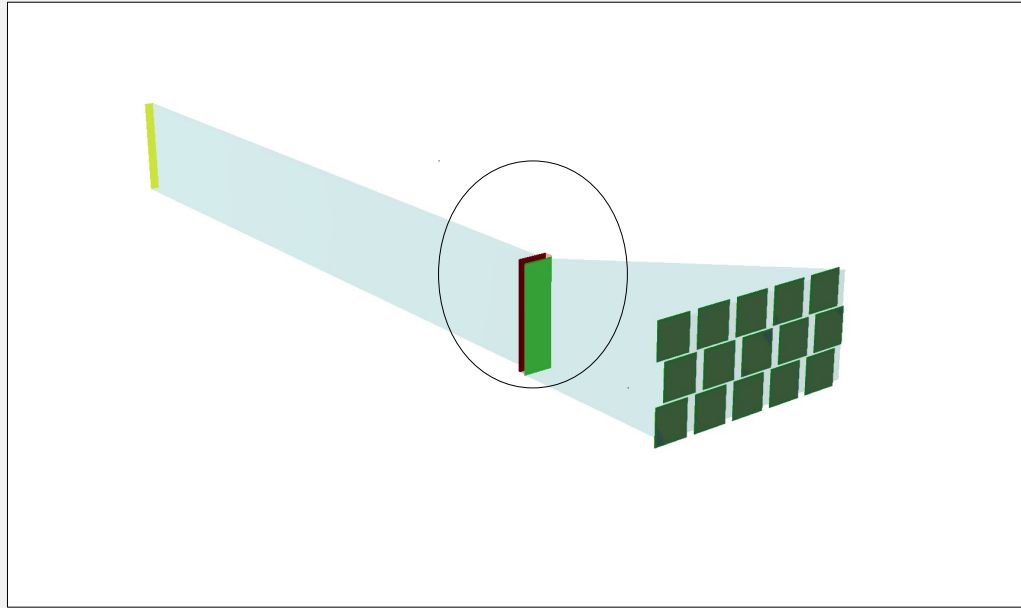


Setup

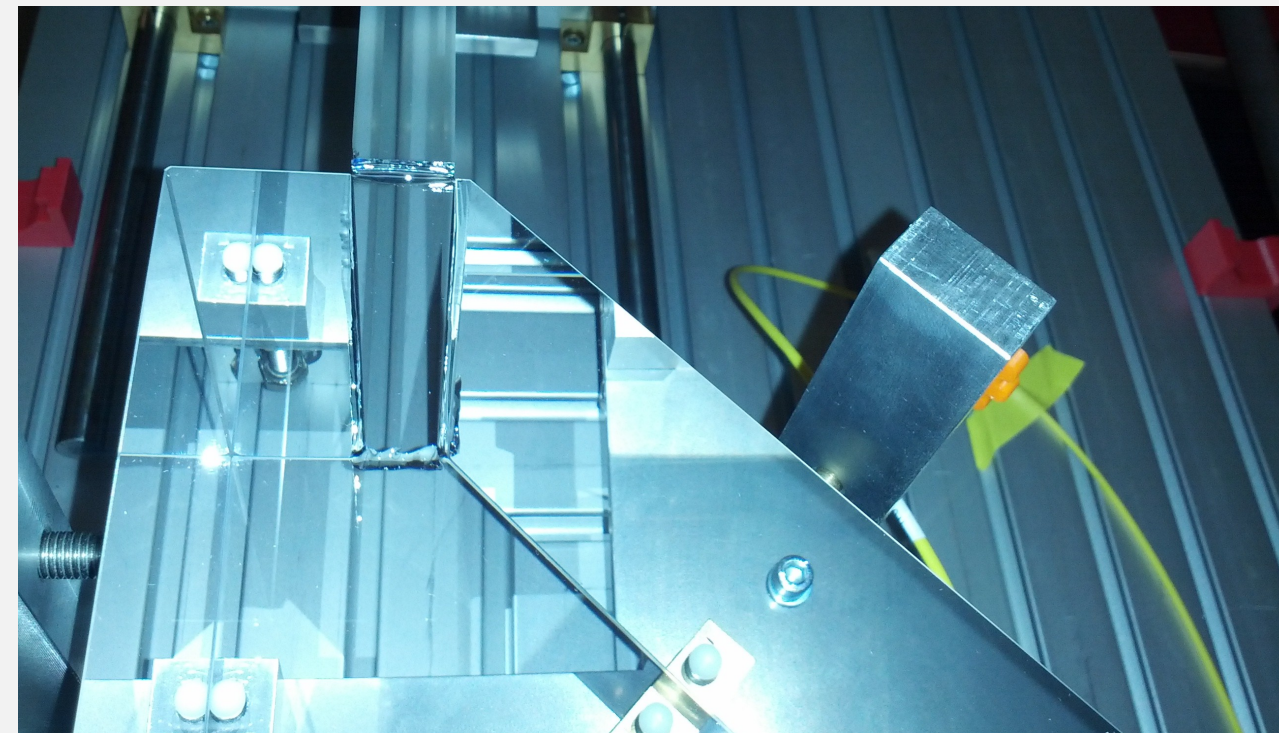


Array of 15 Planacon MCP-PMTs
coupled with optical grease

Setup



with cylindrical lens



directly

Plate coupled to prism

Setup

PMT read out with
PADIWAs

60 PADIWA on
prototype



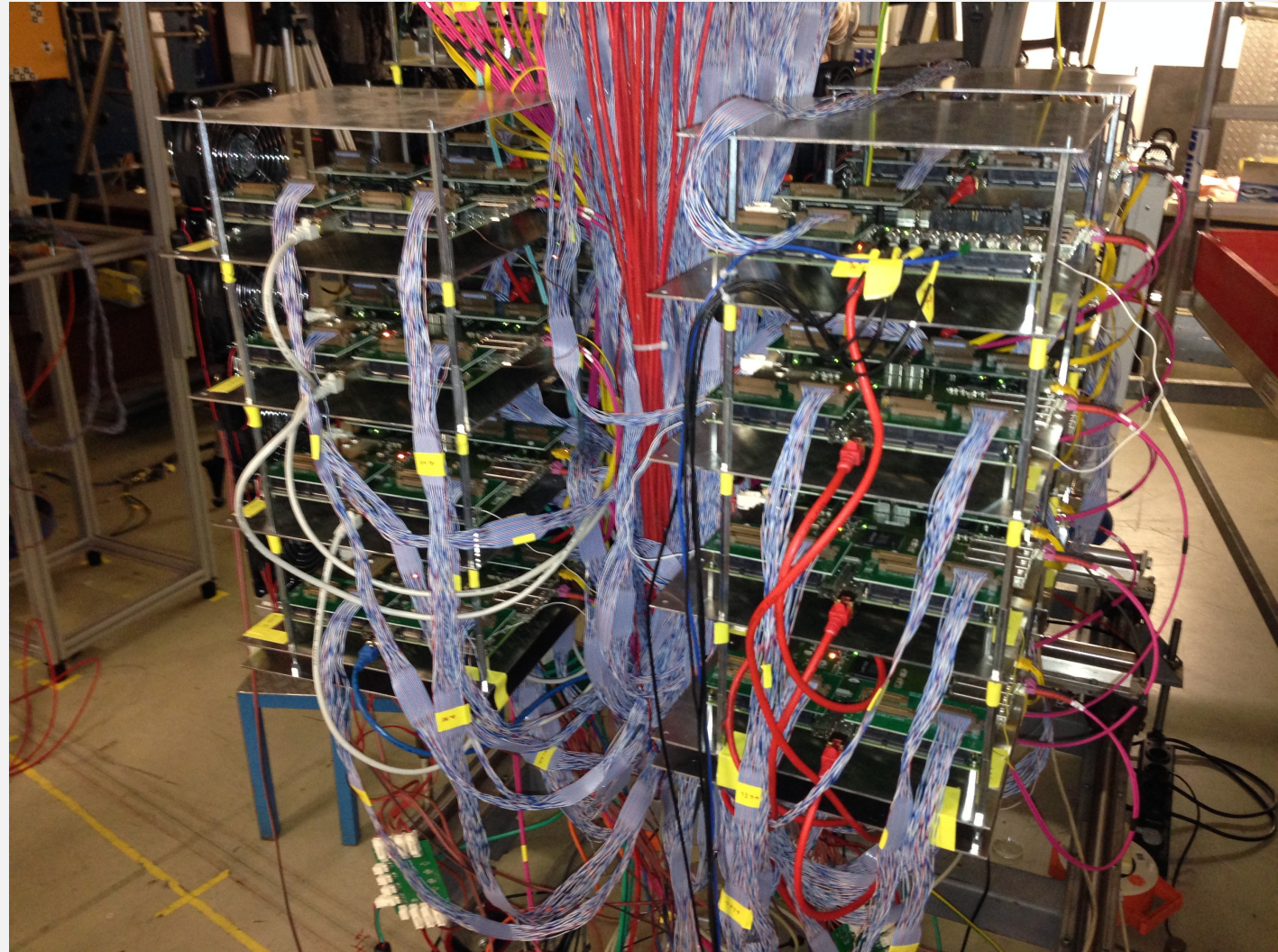
Setup

PMT read out with
PADIWAs

60 PADIWA on
prototype

and TRBv3

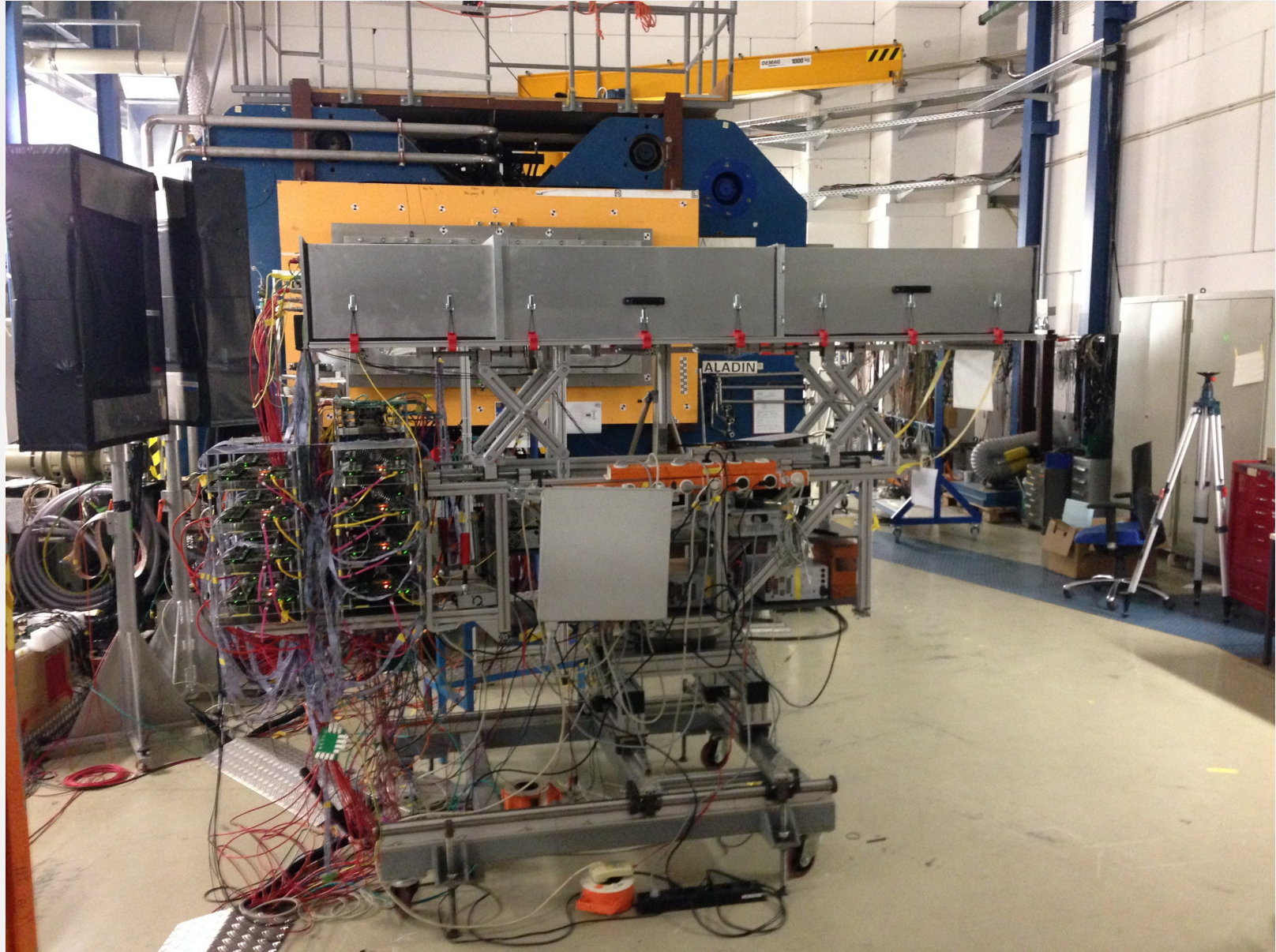
- TRB
 - 4 TDC
 - 16 leading & trailing edges
 - One TRB per PMT
- 15 TRB plus some additional for aux. counters
- 23 TRB in total



That is an impressive number and possibly more than we will use in the full experiment!

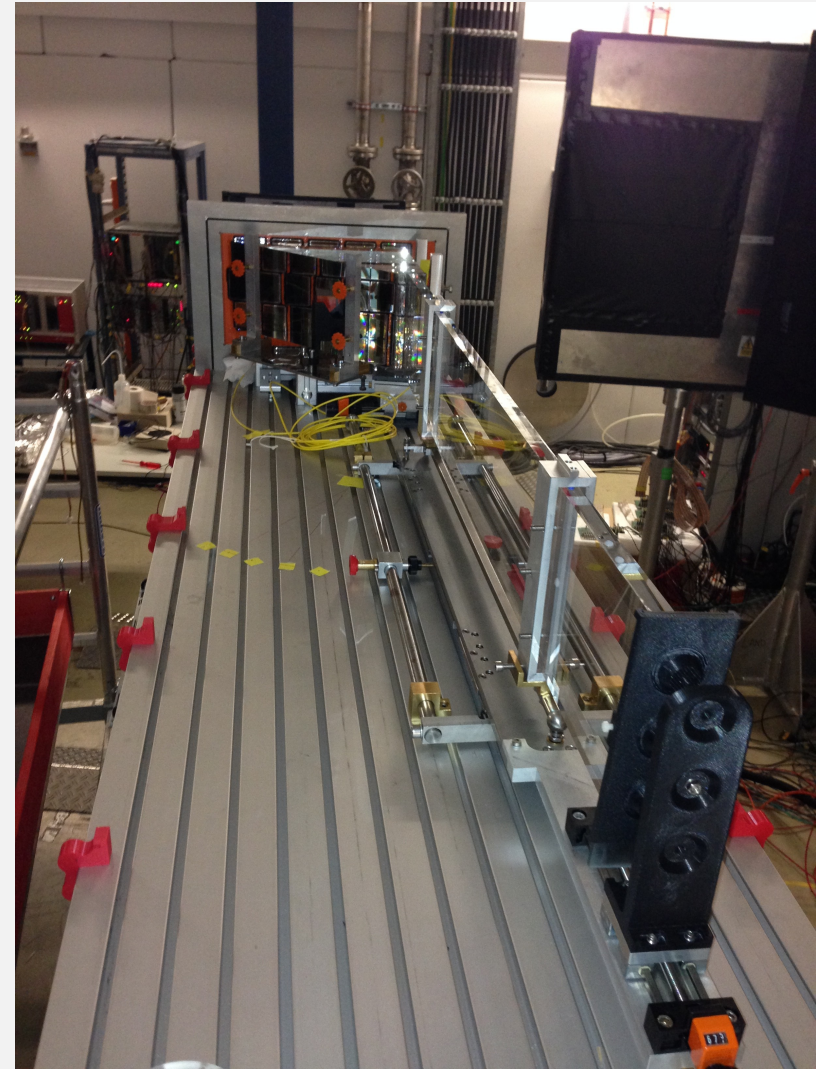
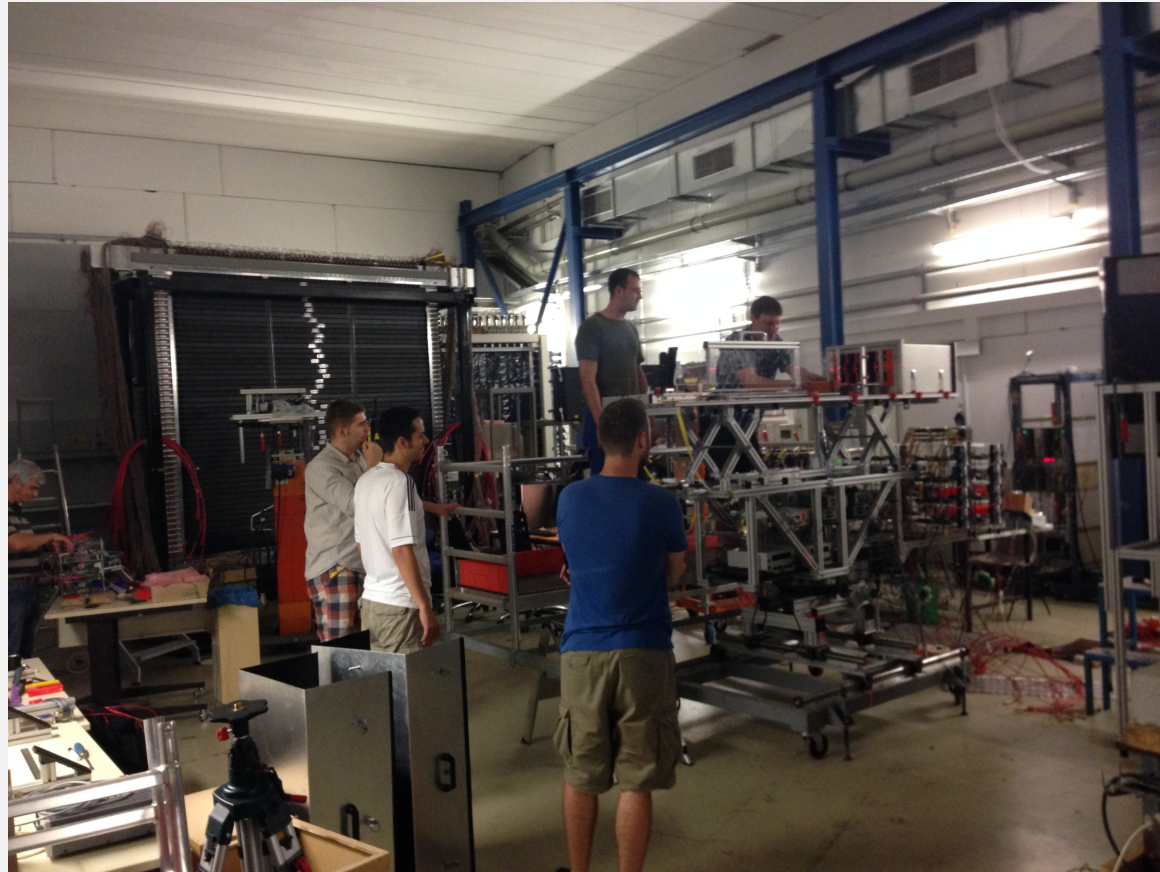
Environment

Prototype behind ALADIN magnet
beamline in 2m height

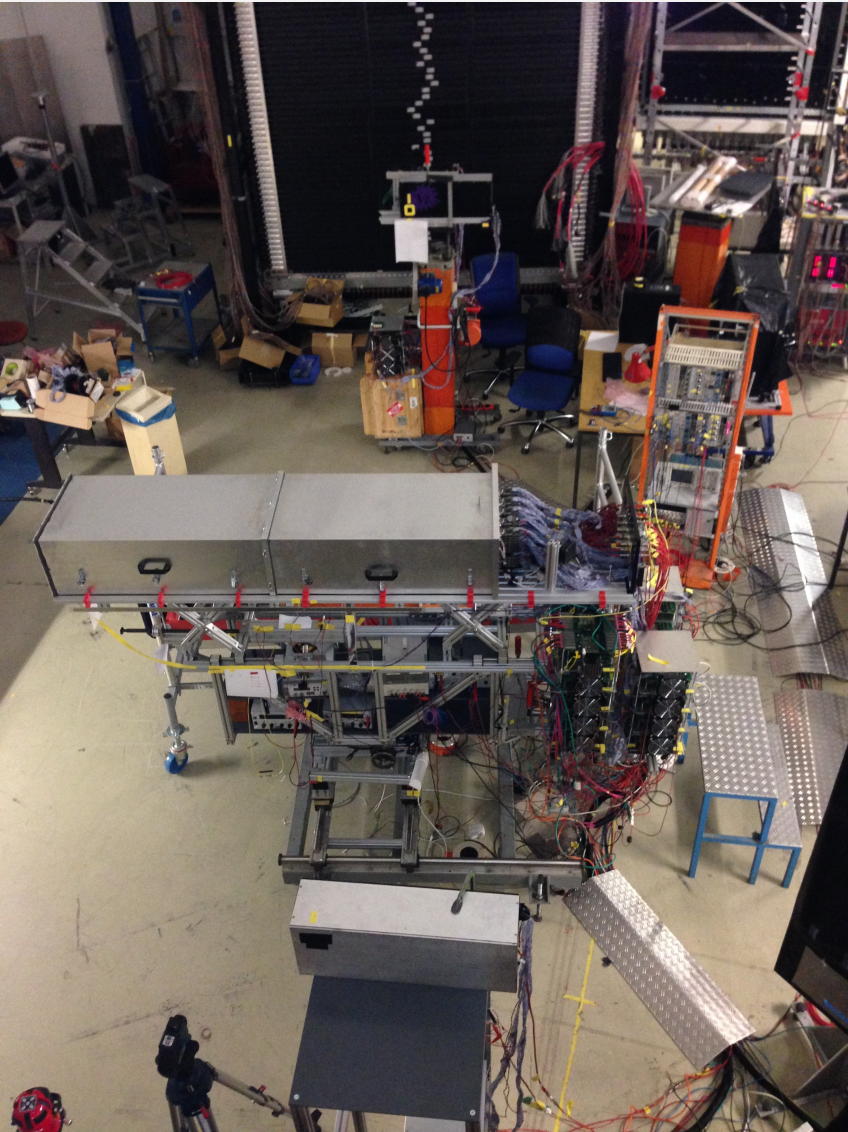


Environment

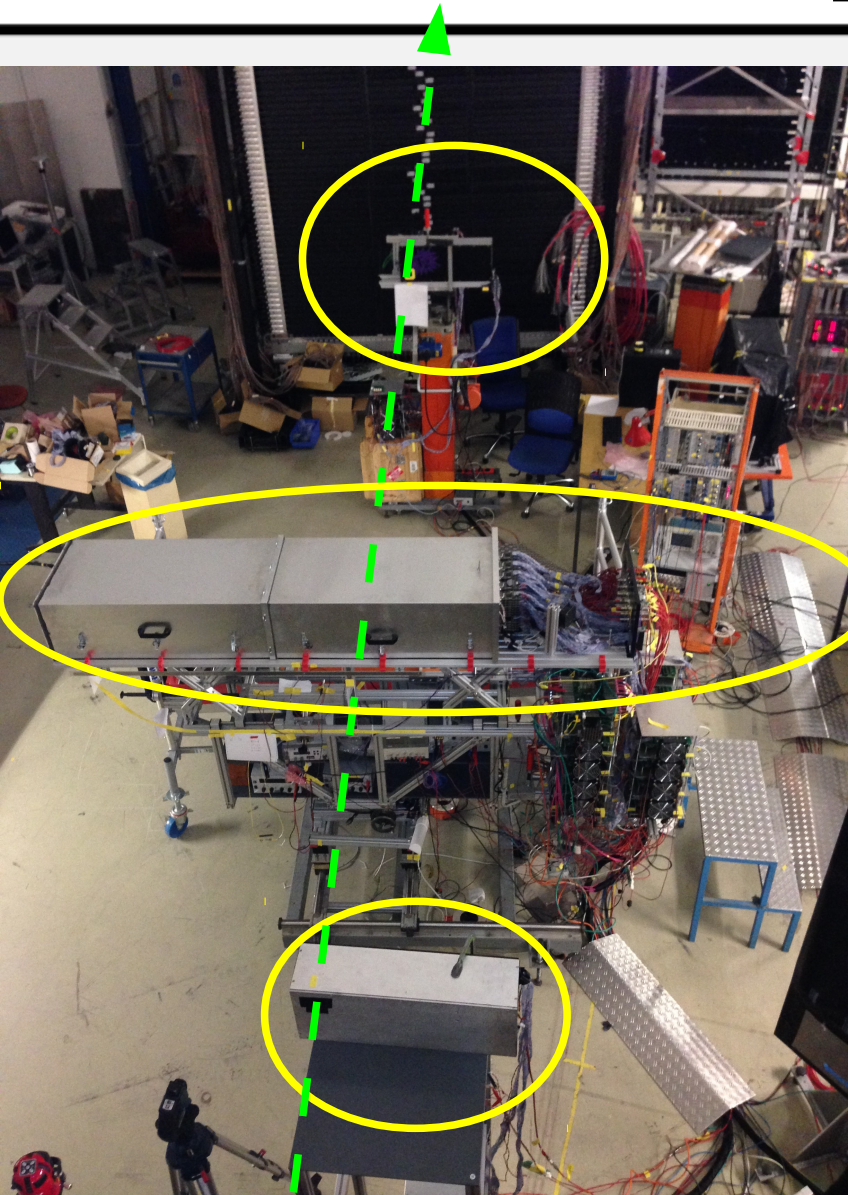
Prototype behind ALADIN magnet
beamline in 2m height



Environment



Environment



Downstream

Trigger counter
MCP-TOF Counters
Fiber Tracker

Changes in Aug:

moved position
removed

Barrel DIRC Prototype

exchanged tubes,
PADIWA,
TRB
and PC

Upstream

Fiber Tracker

removed

not visible

Trigger counter
ALADIN
MCP-TOF Counters

removed

Measurements

July:

Beam intensities between
50/spill and 3000/spill

ToFs indicate that we have a pure pion
beam

Our (aged) DAQ server was pushed to
(and beyond) its limits while recording the
data rate

In total 10h of beam:

beam tuning
without lens
polar angle scan
Z scan
with lens
polar angle scan
X scan

Measurements

July:

Beam intensities between
50/spill and 3000/spill

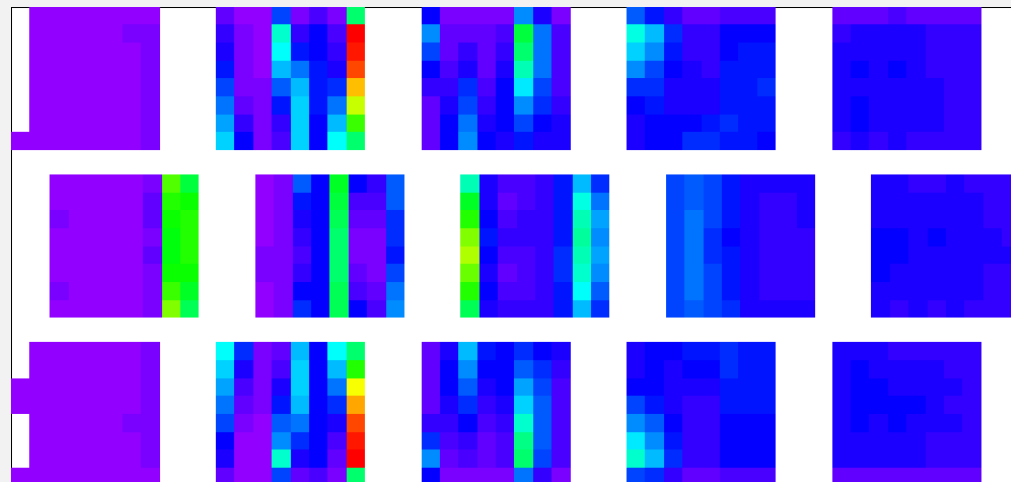
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Our (aged) DAQ server was pushed to
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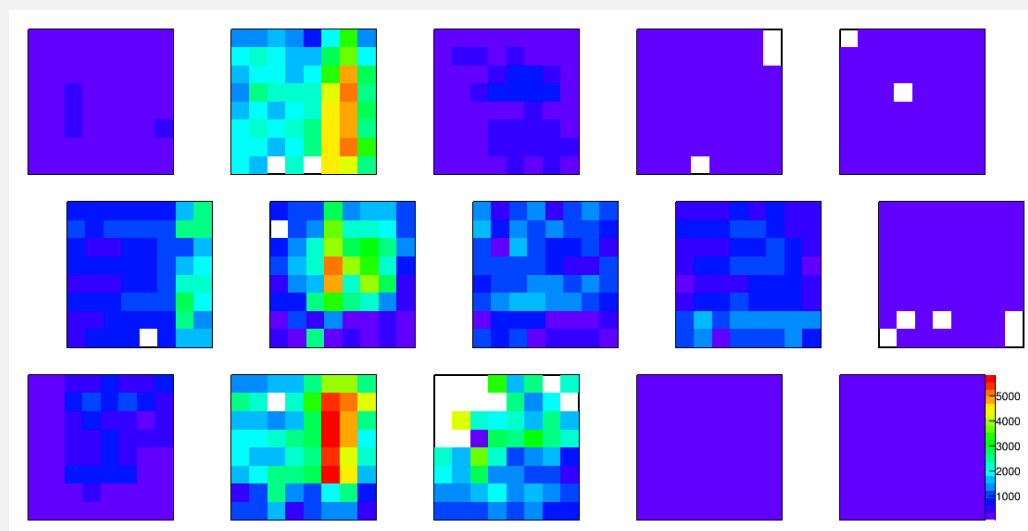
In total 10h of beam:

beam tuning
without lens
polar angle scan
Z scan
with lens
polar angle scan
X scan

with lens
 $\theta = 120^\circ$

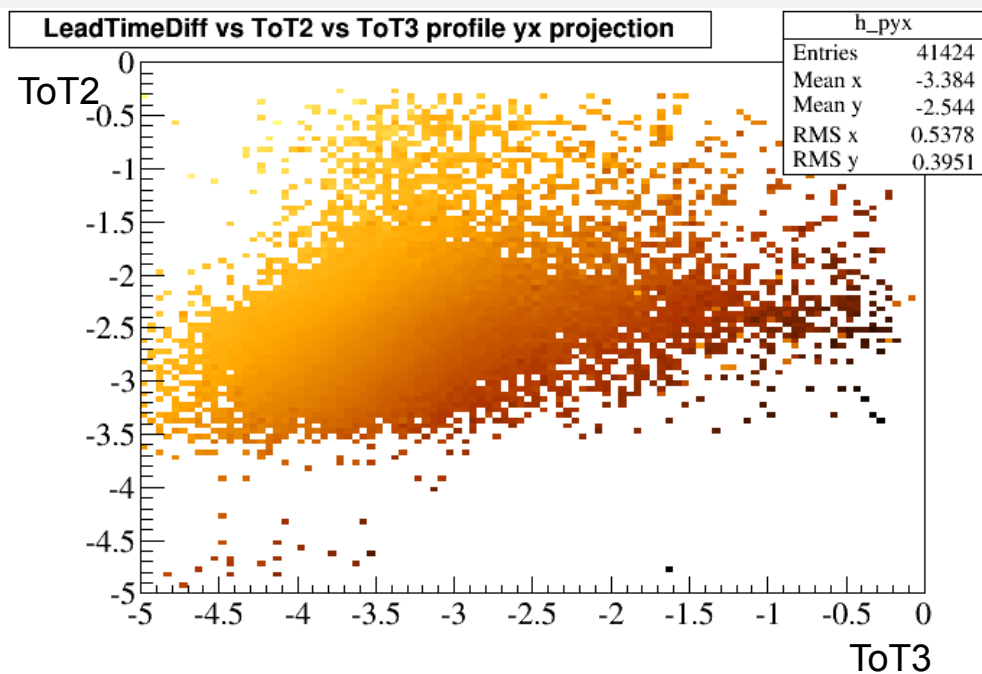
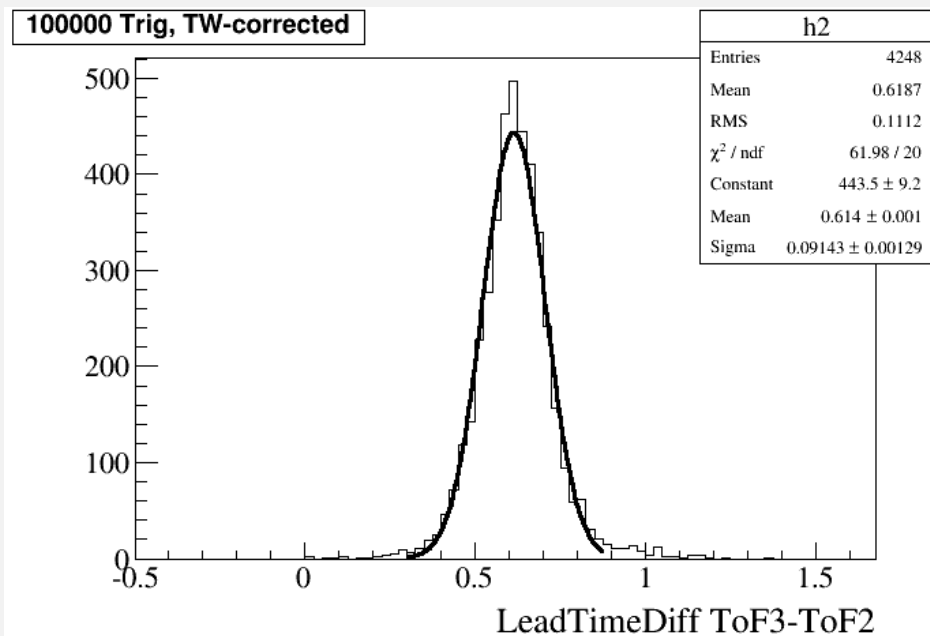
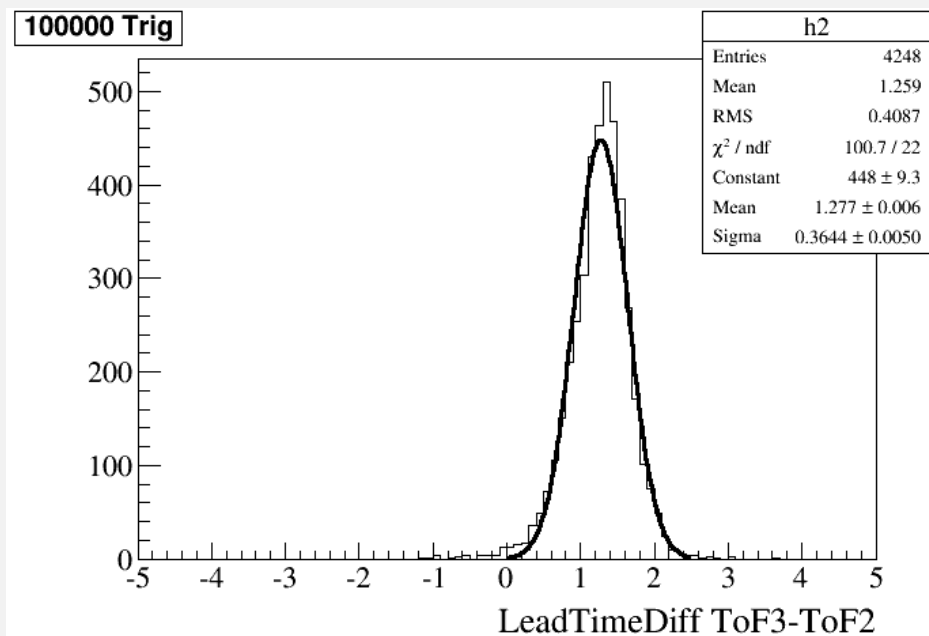


simulation



data

First Results – Timing



For the ToF a timewalk correction is possible and results in a 91 ps time resolution between the downstream sensors

So our DAQ delivers sufficient timing!

Measurements

Aug, still ongoing:

Beam intensities up to 6000/spill

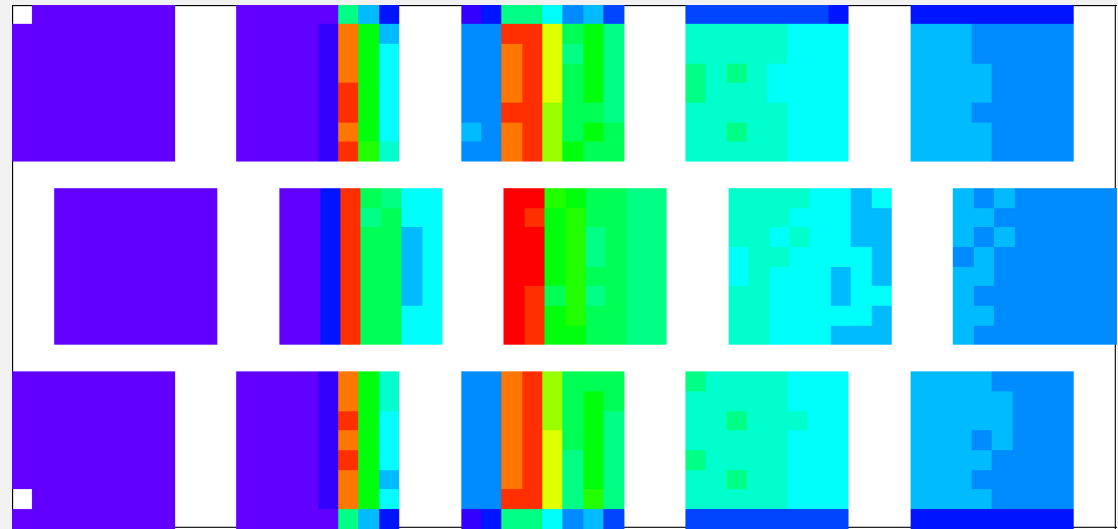
Beam time is quite stubborn, we face problems, such as GSI power outage, biorem alert,...

Measurements with plate:

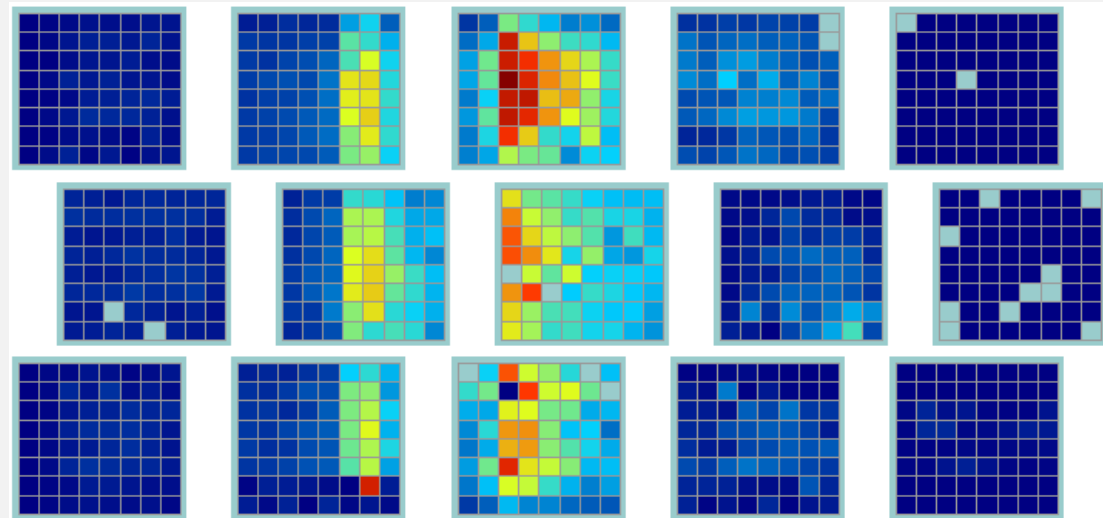
with lens
polar angle scans,
high statistik runs
x-scan

without lens
polar angle scans

with lens
 $\theta = 69^\circ$



simulation

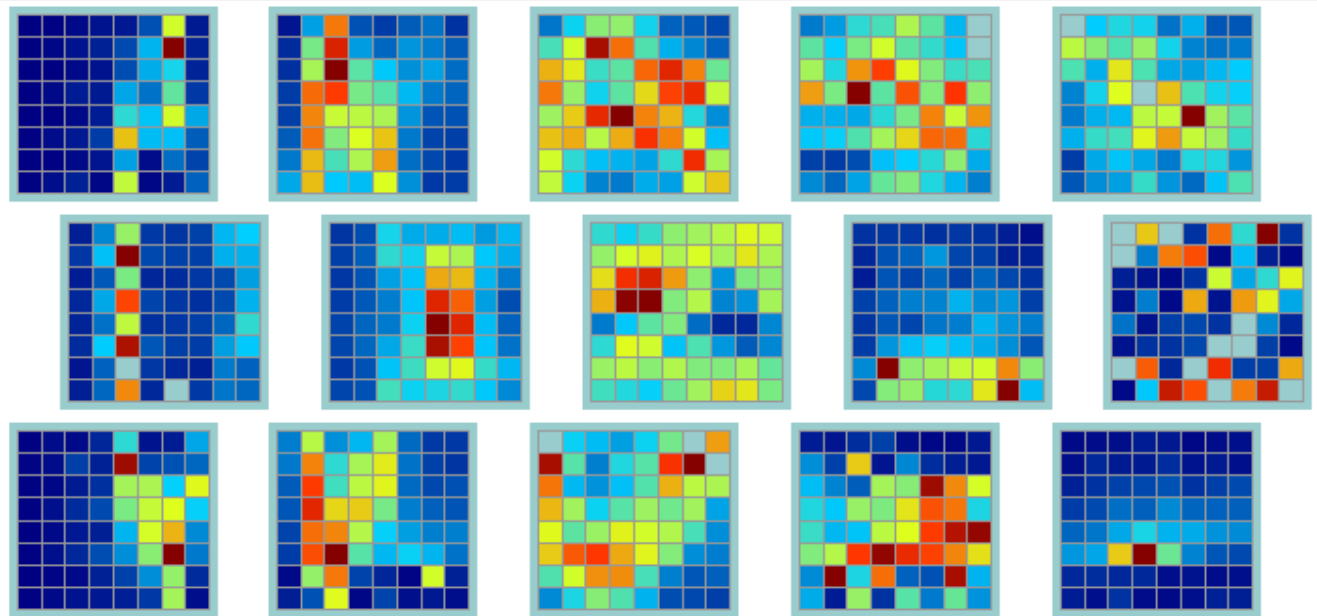
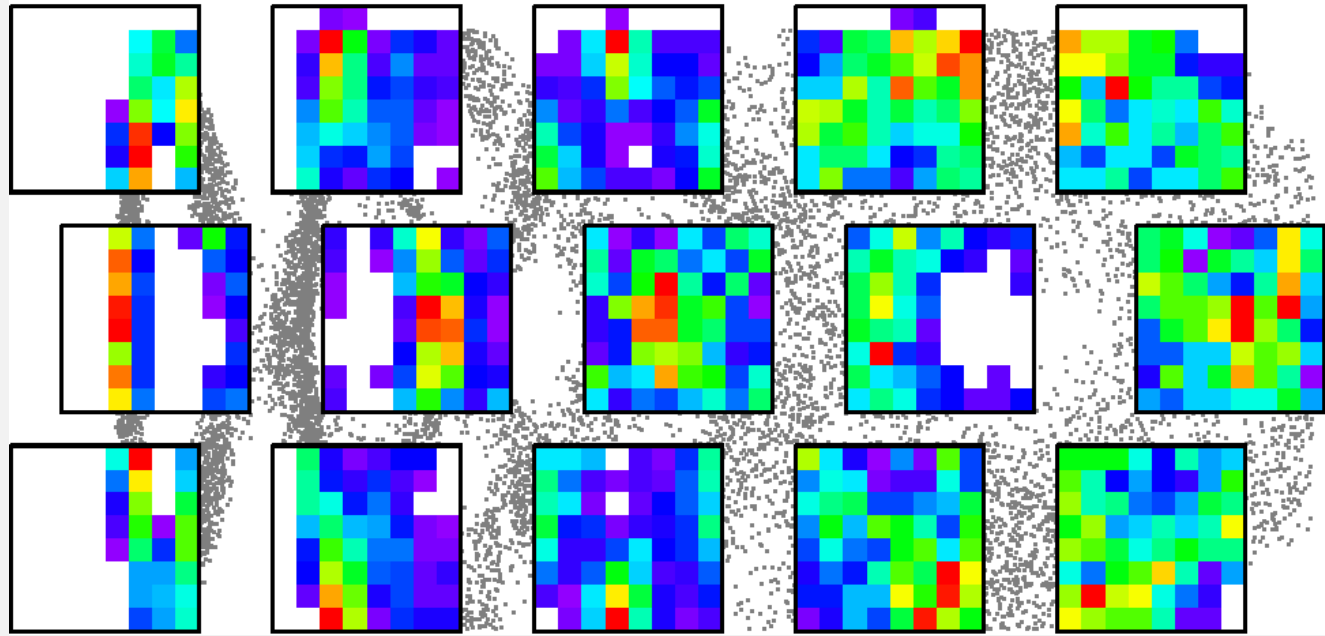


data

Measurements

Last saturday the plate was removed and the bar was installed to test a focusing option with a new 3-component high refractive lens

First look on occupancies
(from saturday):
 $\theta = 125^\circ$



Next steps

- Data looks exciting, but has to be processed.
- If the simulation for the plate setup can be matched with the beam data, this beam time can help to make necessary design decisions for the TDR.
- Issues with infrastructure (lab space) and pion beam quality will probably not allow us to reach our measurement goals this time.
 - The low momentum pion beam at GSI does not allow direct confirmation of PID performance.
 - The large beam diameter limits measurements of single photon resolution and photon yield.
- Another beam time at CERN T9 with mixed hadron beam is most likely required next year to complete TDR.