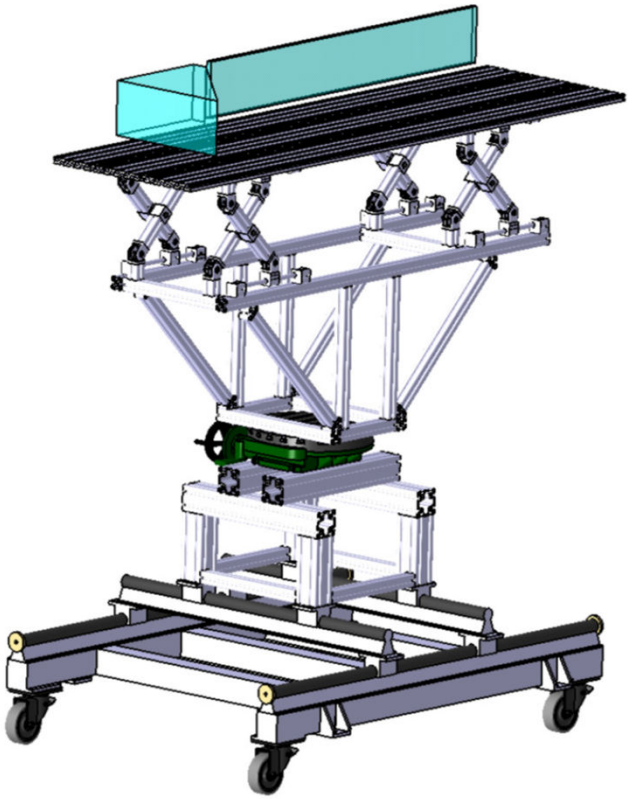
BARREL DIRC STATUS AT GSI



Focus on GSI test beam in May and August:

- Validate design options for TD
- Prototype design, simulation, and reconstruction.

PandaRoot simulation and reconstruction.

Fused silica radiator quality control setup.

Today: snapshot of the status.

Part 2: test beam plan, instrumentation, schedule, etc.

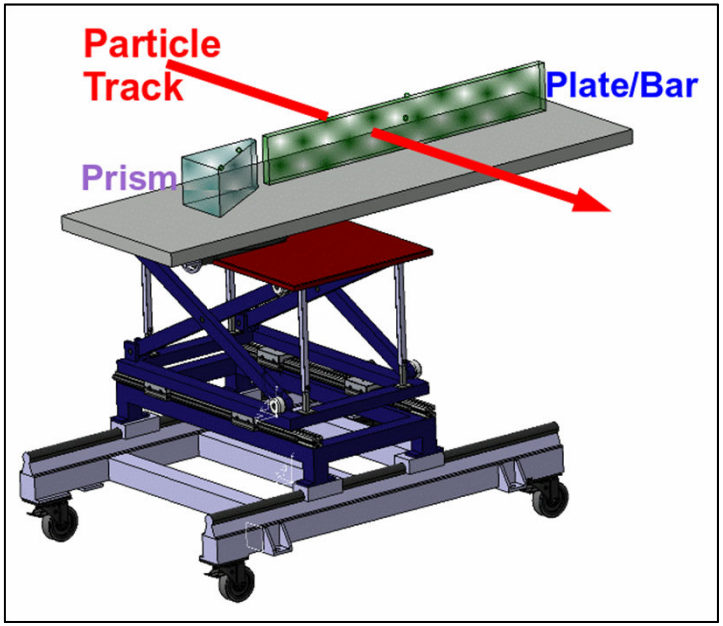
Jochen Schwiening

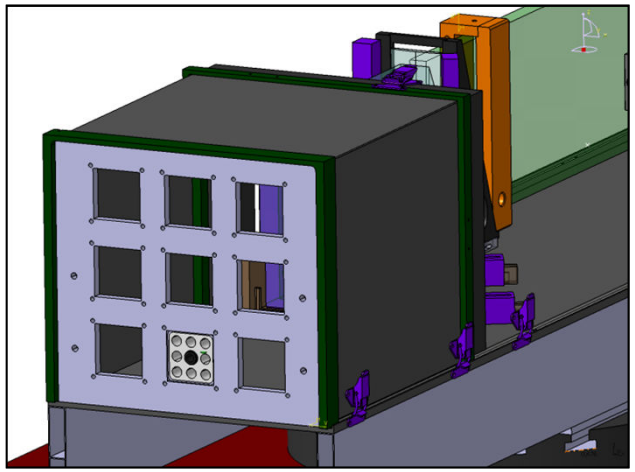
for the GSI DIRC Group

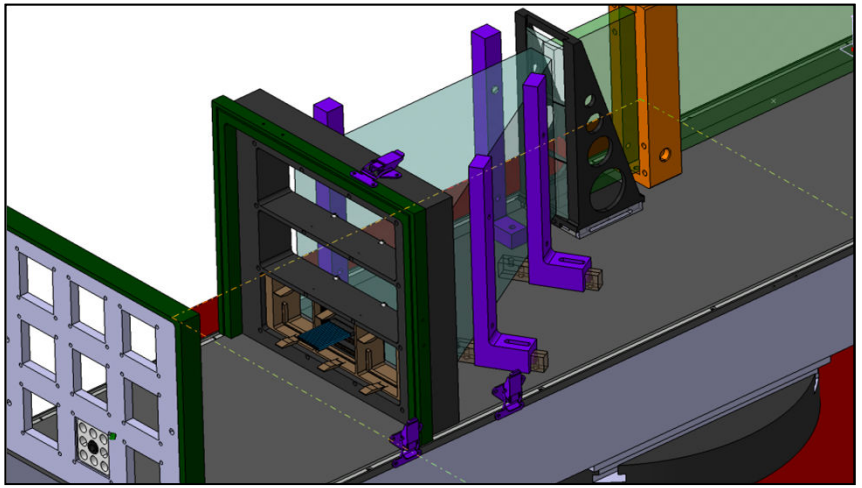
PANDA CollabMeet
PID Session
March 11, 2014

Reminder: setup used at CERN in 2012

"Proto 3" – expansion volume: large fused silica prism,
bar or plate attached with or without focusing,
readout using 3x3 MCP-PMT array,
more compact, better light yield, easier to align.







BARREL DIRC PROTOTYPE

2014 setup will be similar to 2012 setup

keep components that worked well in 2012, replace those that didn't, adjust to GSI cave

Main differences between Proto3 and Proto4:

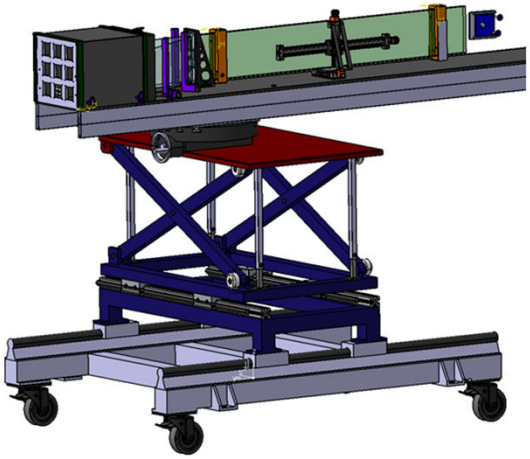
readout based on TRB3 and PADIWA (and Mainz NINO FEE)
choice between 30deg and 45deg prism (requiring 12 – 18 Planacons for full coverage)
wider and longer radiator support plate for larger 45deg prism option
more stability for bar/plate support, new holders for bar/plate, mirror, lens
easier height/angle adjustment (remote controlled rotation)
beam line at 2m height (setup behind ALADiN detector)

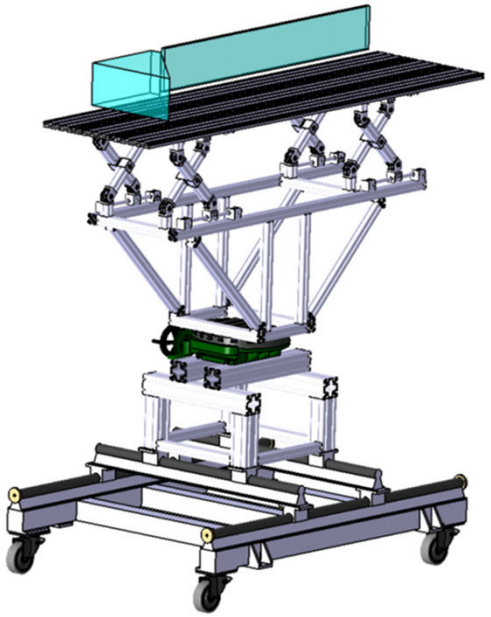
Parts have been ordered, construction to start this month

(Andreas, Doro, Simon)

Familiarizing ourselves with TRB3/PADIWA

readout, data format, getting ready for system test (Carsten)





BARREL DIRC PROTOTYPE

30deg prism easier to handle, needs fewer MCP-PMTs

used 3x3 Planacons in 2012 but that left part of prism uncovered

inprove coverage for 2014 and add “staggered” pixel layout to decrease pixelization effects

45deg prism is heavier and needs more MCP-PMTs for full coverage (3x6=18)

closer to preferred size for PANDA, fewer ambiguities in geometric reco

MCP situation:

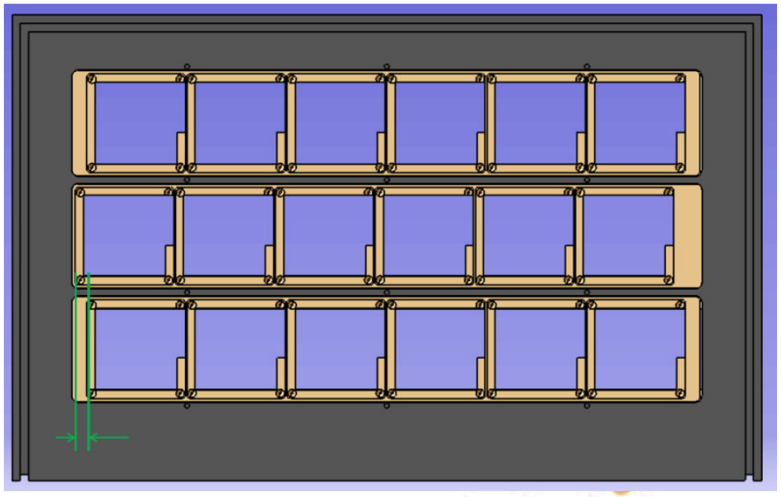
12 high-quality new Planacons at GSI (or still on loan at Mainz, Giessen)

4 more OK-quality Planacons at GSI

would need to ask for loan some Planacons from Giessen, Mainz, Erlangen

Selection of prism size and MCP-PMT coverage will be based on simulation results

(Roman, Marko, Greg)



BARREL DIRC SIM/RECO

New standalone Geant4 prototype simulation close to ready;

tune to 2012 test beam data, modify for 2014, basis for prototype design decisions (Roman).

Plate reconstruction approach (time-based PDFs) being tested on 2012 data, preparation for 2014 analysis (Marko).

Cost/performance optimization results from PandaRoot study close to completed (Maria, Roman).

Several promising new design options have emerged (width of bars, prism instead of oil tank, lens configuration, etc), need to be validated with test beams.

Analysis of 2012 test beam data for bars close to completed (Greg).

DIRC PID information from maximum likelihood track fit available in PandaRoot (Harphool).

Working on simplified (fast) parameterization of DIRC PID for upcoming simulation campaigns.

Lens optimization ongoing in Geant and ZEMAX (Carsten, Roman)

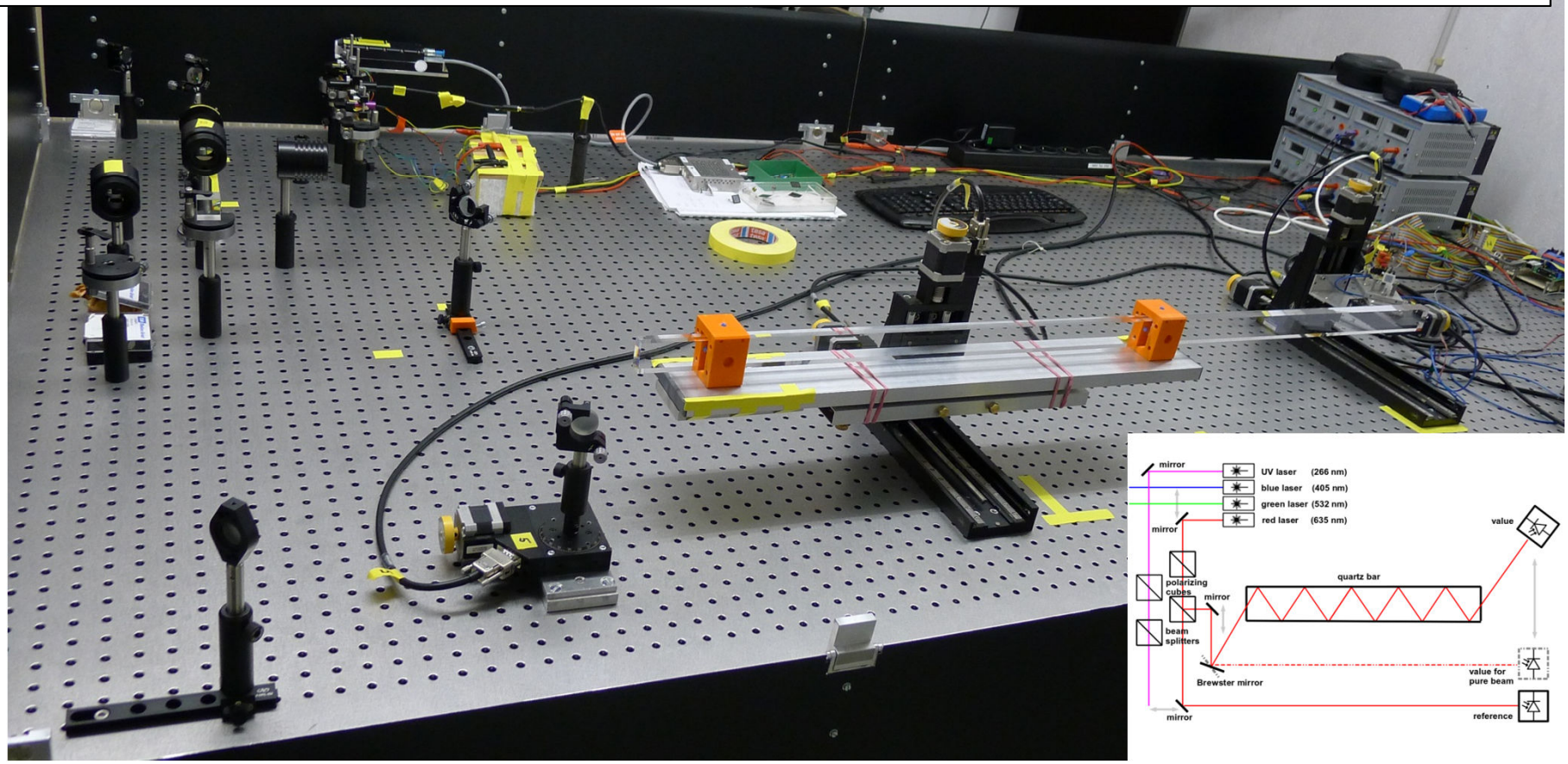
Testing different materials to generate flatter focal plane.

DIRC Radiator Quality Control

After >16 months shutdown our laser lab reopened, work resuming (Greg, Marvin).

Calibrating setup, understanding bugs/features of new configuration.

Should be ready to measure new bars/plates soon (Zeiss, LZOS, Boeing, Zygo. AOS).



Setup still in old dark room, will move to new DIRC lab containers in Heckhalle in fall/winter 2014.

GSI TESTBEAMS 2014

May test beam time starts May 2nd, ends May 18th, joint schedule with HADES;

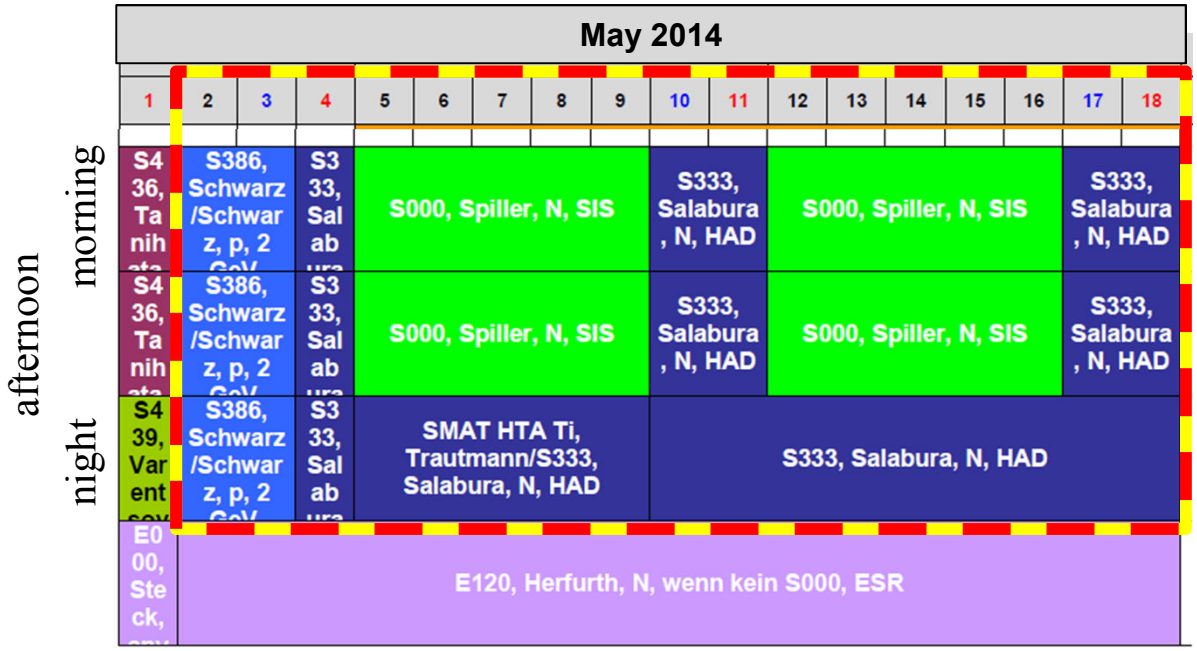
parasitic mode, detailed spill distribution TBD, approx. according to shift ratio: ≥10% to DIRC?

2-3 days protons to set up and steer beam into caves then pions for bulk of time

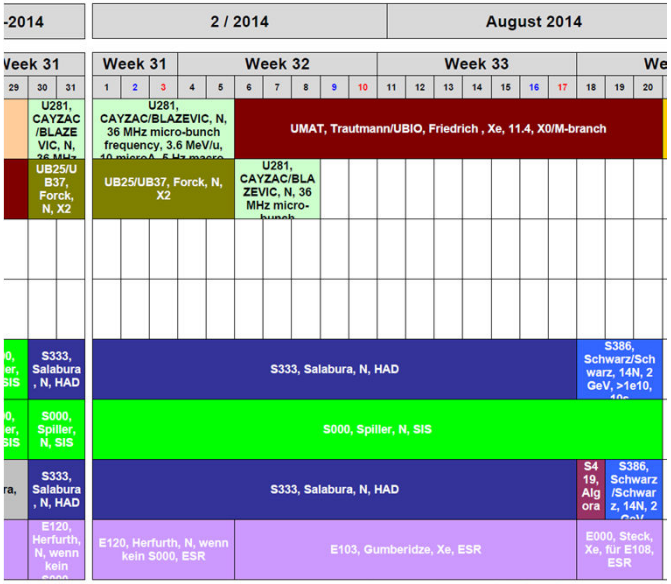
(momentum TBD, first idea 1.7GeV/c with up to 10^6 per 10sec spill – all approx – beam quality TBD)

Machine development during weekday morning&afternoon shifts.

Primary goals: readout electronics validation, comparison of timing PDFs for plate geometry in data and simulation, prism geometry for bar and plate, preparation for main (and final) beam time in August.



August schedule 7/30-8/20,
Disk DIRC already expressed interest.



GSI TESTBEAMS 2014

What additional instrumentation do we have/need?

In 2012 used two TOF stations (Erlangen) and two SciFi stations (Mainz) plus scintillator trigger.

For ~100ps timing need good event T0 – fast start counter. Mainz? One TOF behind bar? Erlangen?

For plate probably need large veto counter to reject 2nd track – scintillator panels? GSI?

For plate reco may want SciFi stations for track position/angle – material budget? State of SciFi? Mainz?

Need loaned GSI MCP-PMTs back, please, plus any loaners we can get from DIRC groups.