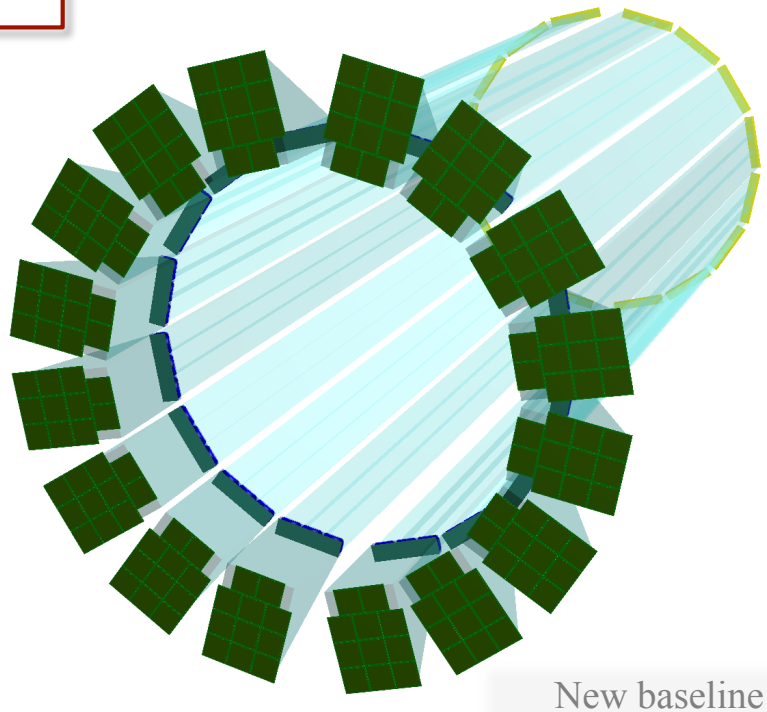
PANDA BARREL DIRC STATUS AT GSI

- Today: compact overview of status at GSI
- Two additional presentations after this talk
- In June: TDR presentation
  and detailed talks about sub-topics



New baseline design in PandaRoot

For additional details: see my PANDA CM talk in December 2015.

PANDA Cherenkov Group:

GSI Darmstadt, JINR Dubna, FAU Erlangen-Nürnberg, JLU Gießen, U. Glasgow, HIM Mainz, JGU Mainz, SMI OeAW Vienna.

Jochen Schwiening

PANDA CollabMeet
Bochum, February 2016

TDR Status

From the Vienna system status report, Dec 2015:

> *Draft of Barrel DIRC TDR in internal circulation; wide plate design, fallback narrow bars.*
> *Hope to present TDR to collaboration at Bochum CollabMeet in March.*

A lot has happened since then.

- the Dec 2015 TDR draft was reviewed internally and several areas of concern identified
- extended editorial board (EEB) met in January and decided
  - TDR not yet sufficiently advanced for presentation in March
  - TDR presentation at GSI CollabMeet in June feasible
  - strengthen TDR coordination: Tassos Belias new co-leader of effort
  - regular monthly/bi-weekly meetings of EBB to track progress
  - change to baseline design: narrow bars are validated, wide plates only as option
    because analysis of plate beam data from 2015 is unlikely to provide plate validation
  - new TDR structure and new assignment of section responsibilities

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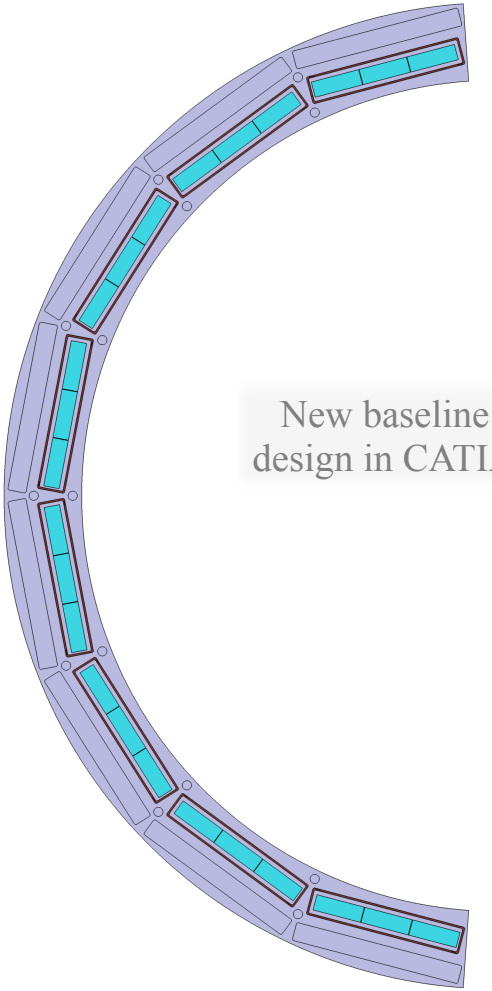
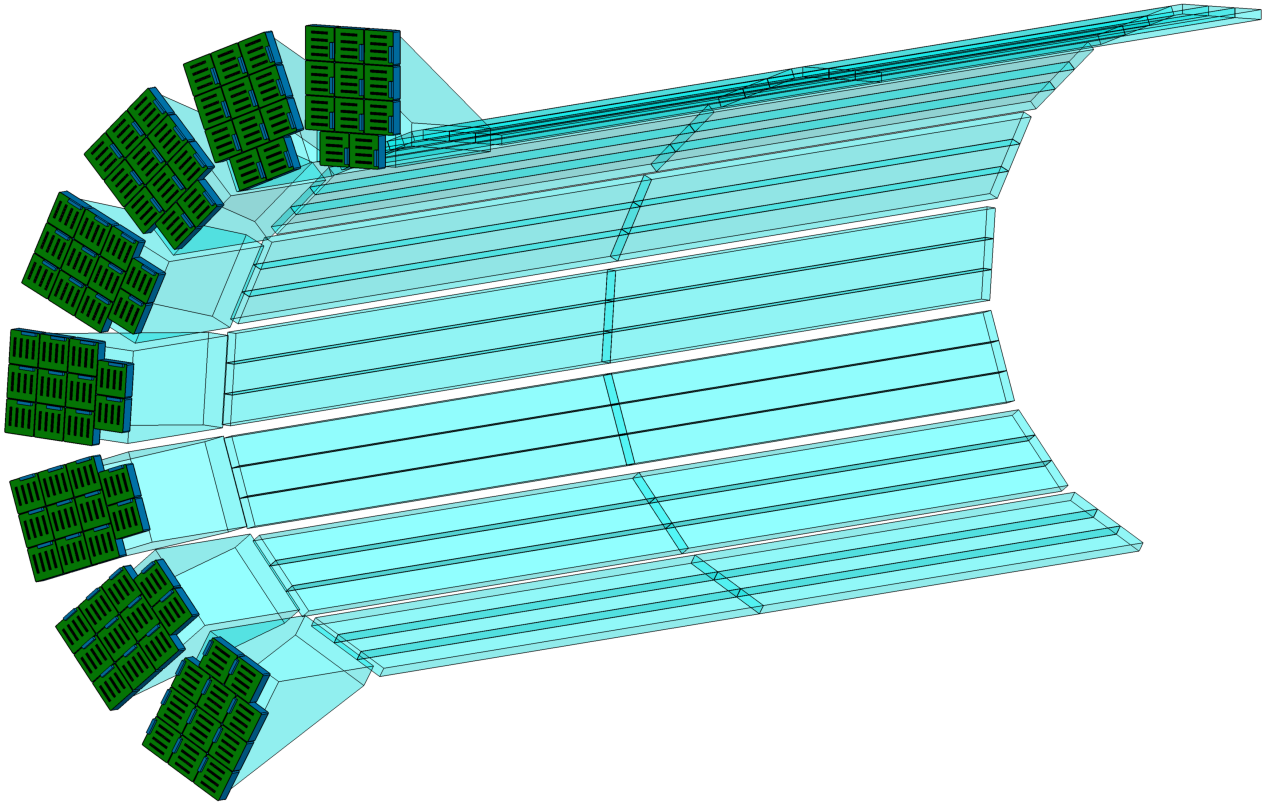
Additional details in presentation by Georg next.

DESIGN UPDATE



New baseline design in CATIA



CERN beam test in 2015 validated use of narrow bars with a solid fused silica prism – this is our new baseline design

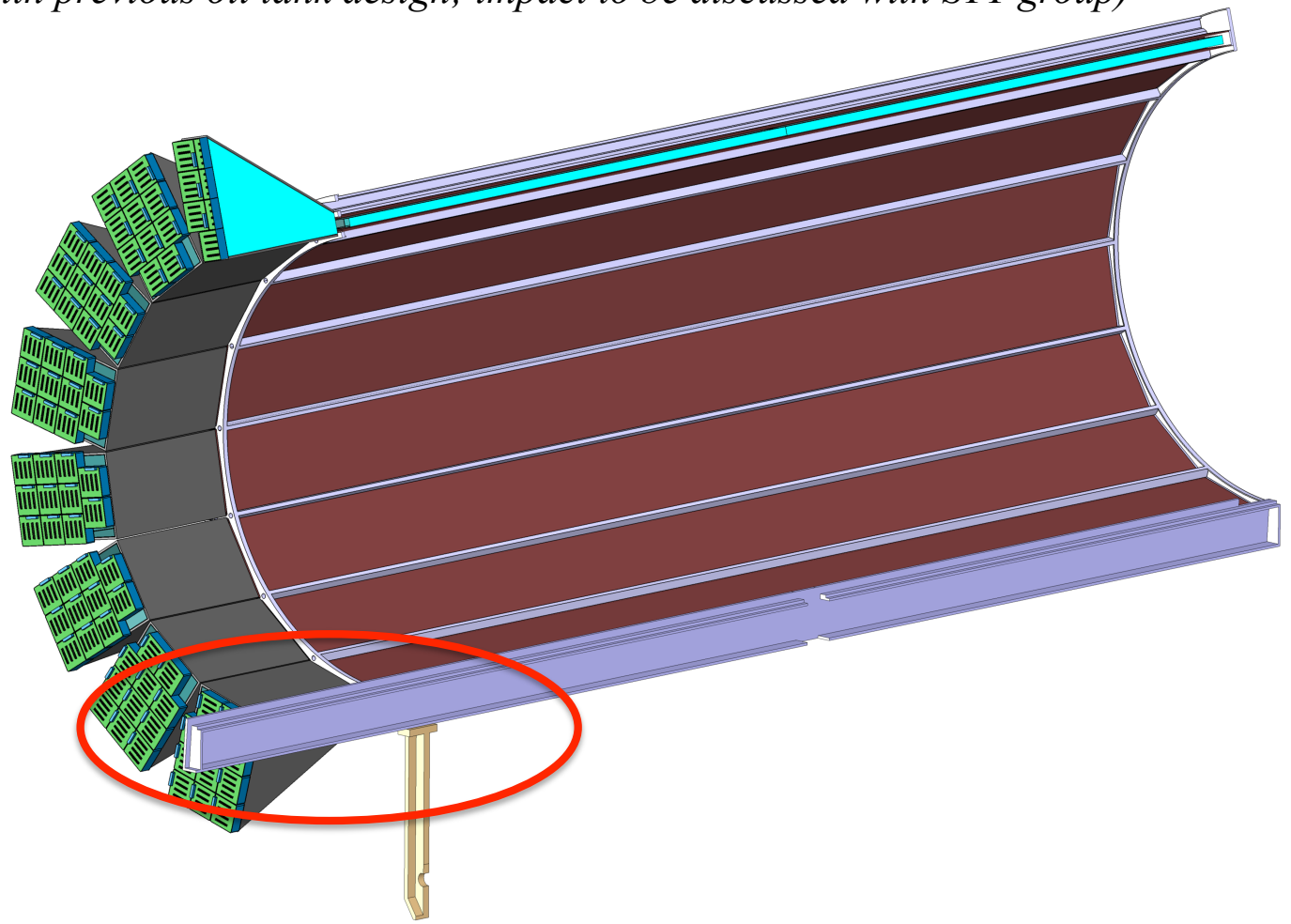
Three bars per barbox (53mm bar width), 11 MCP-PMTs per prism.

CATIA drawings are being updated accordingly (Andreas, Doro).

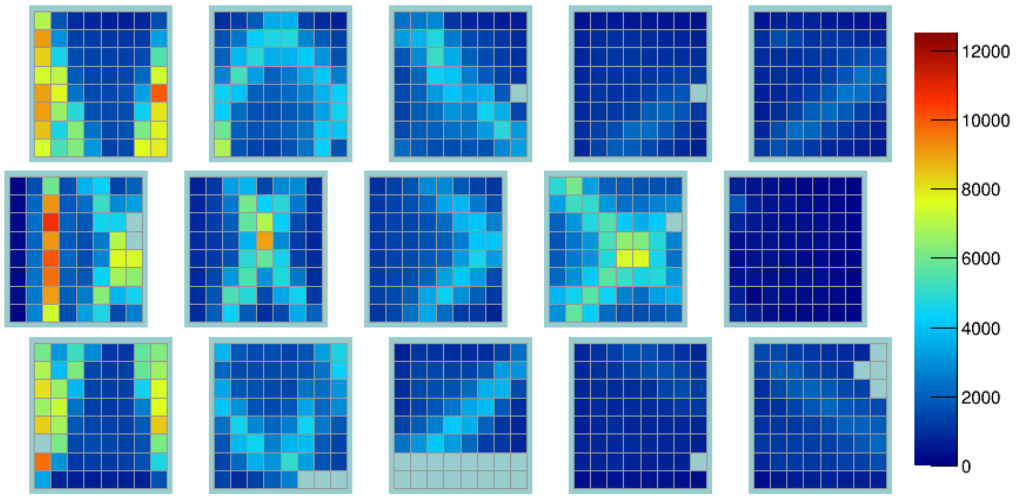
Prism design decision makes space between top/bottom two bar boxes available

to extend top and bottom support beam for STT installation

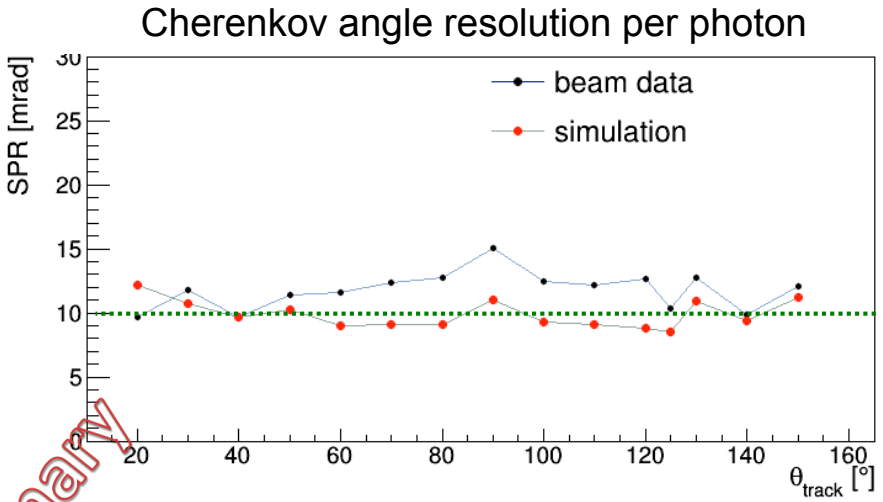
(would have interfered with previous oil tank design; impact to be discussed with STT group)



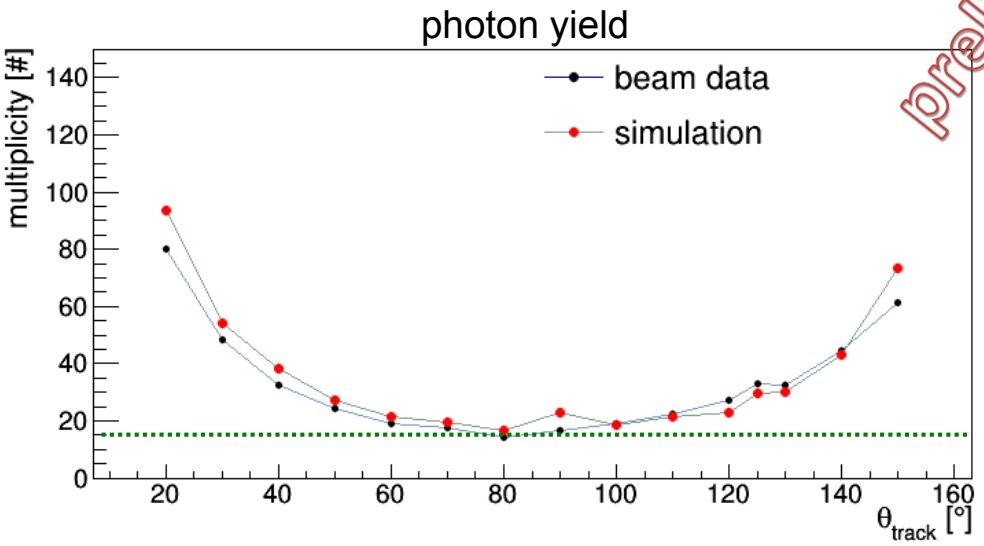
2015 CERN BEAM TEST ANALYSIS UPDATE



Narrow bar, spherical lens, prism,
50º polar angle, 7 GeV/c momentum



preliminary



Figures from Vienna talk – update later

Significant progess since then
(Roman, Marvin, Greg, Lee)

- better matching of sim to data
- time-based imaging test
- start of plate analysis

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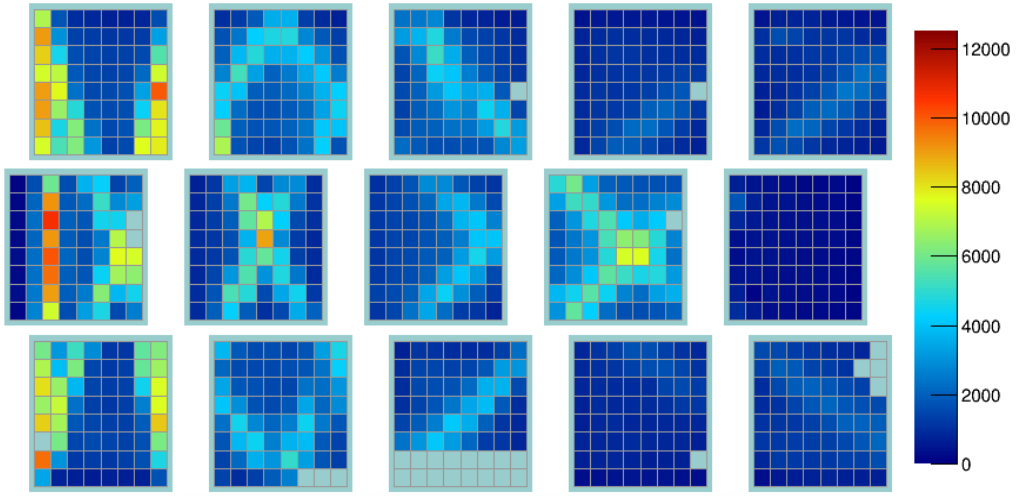

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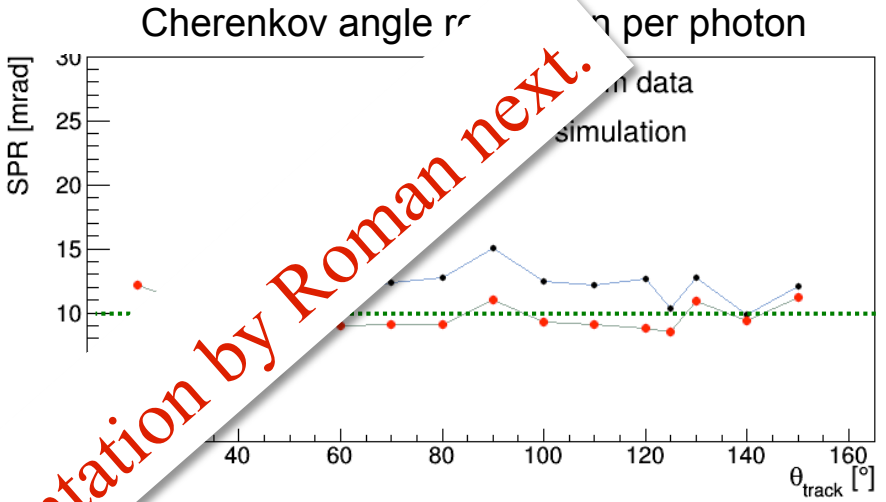

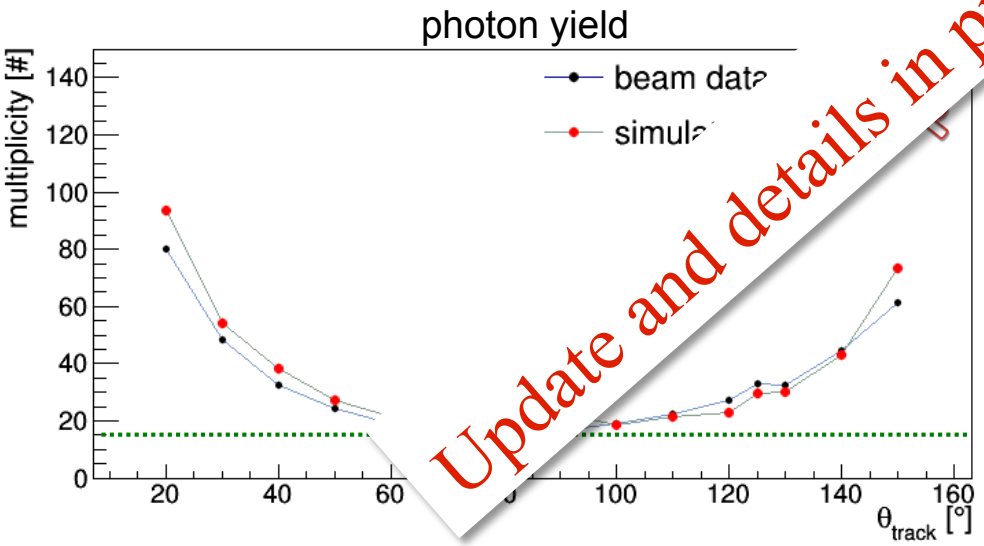

Update and details in presentation by Roman next.

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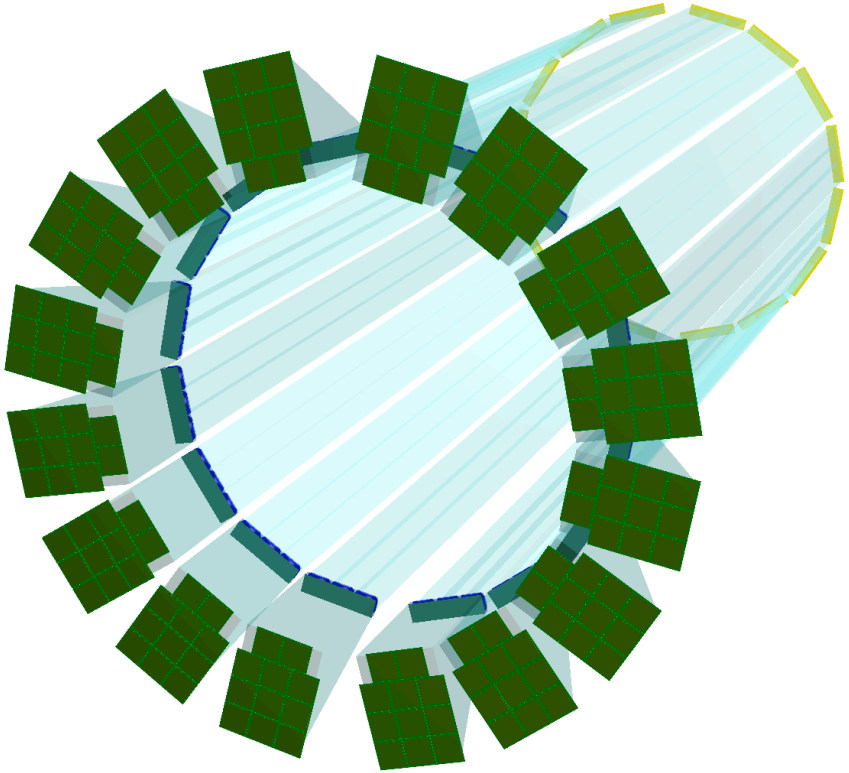
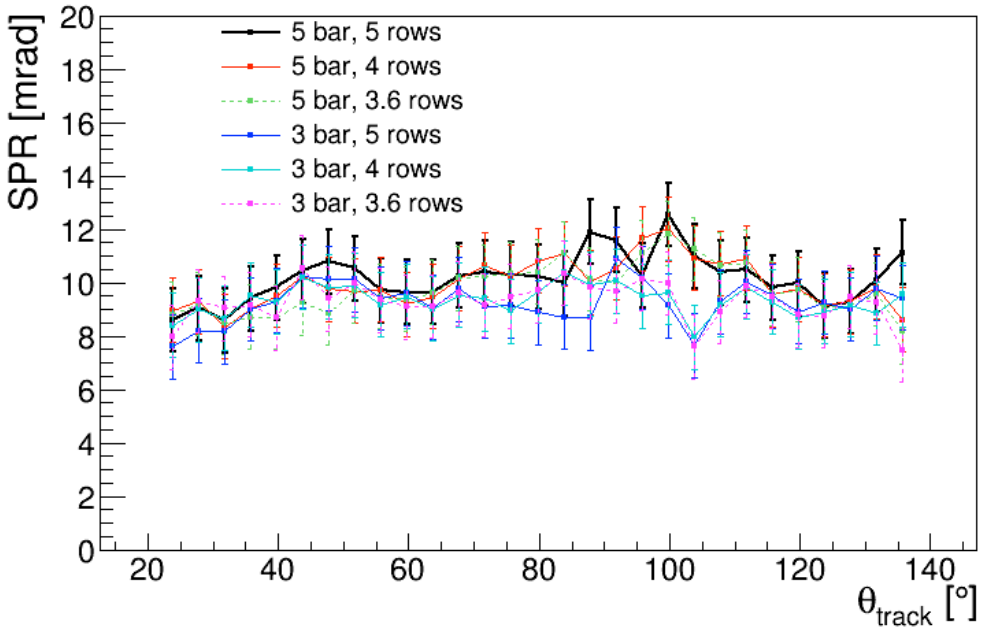
Beam test at CERN validated performance of design with narrow bar and prism.

But: we used a 35mm-wide bar (5/bar box), new design calls for 53mm-wide bar (3/bar box) and a prism with different size (more MCP-PMTs per prism)

Use simulation to compare performance of 35mm and 53mm bars and different number of MCP-PMTs per prism (Roman)





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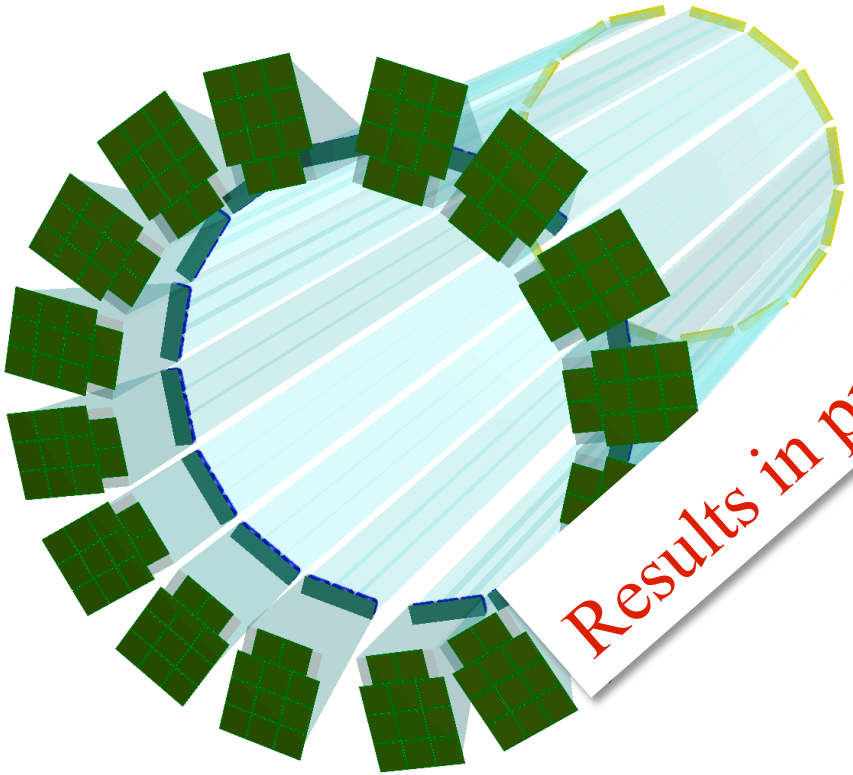
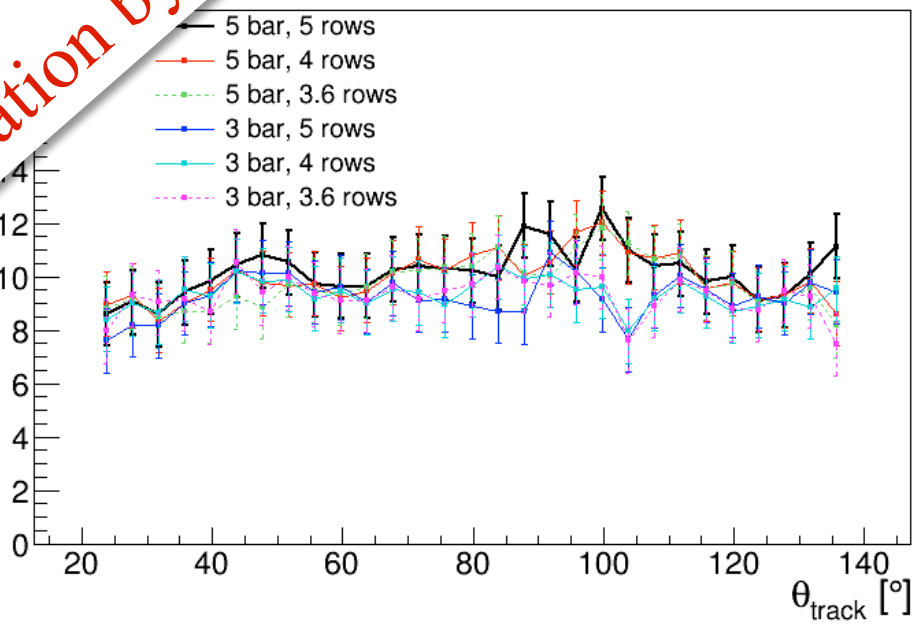
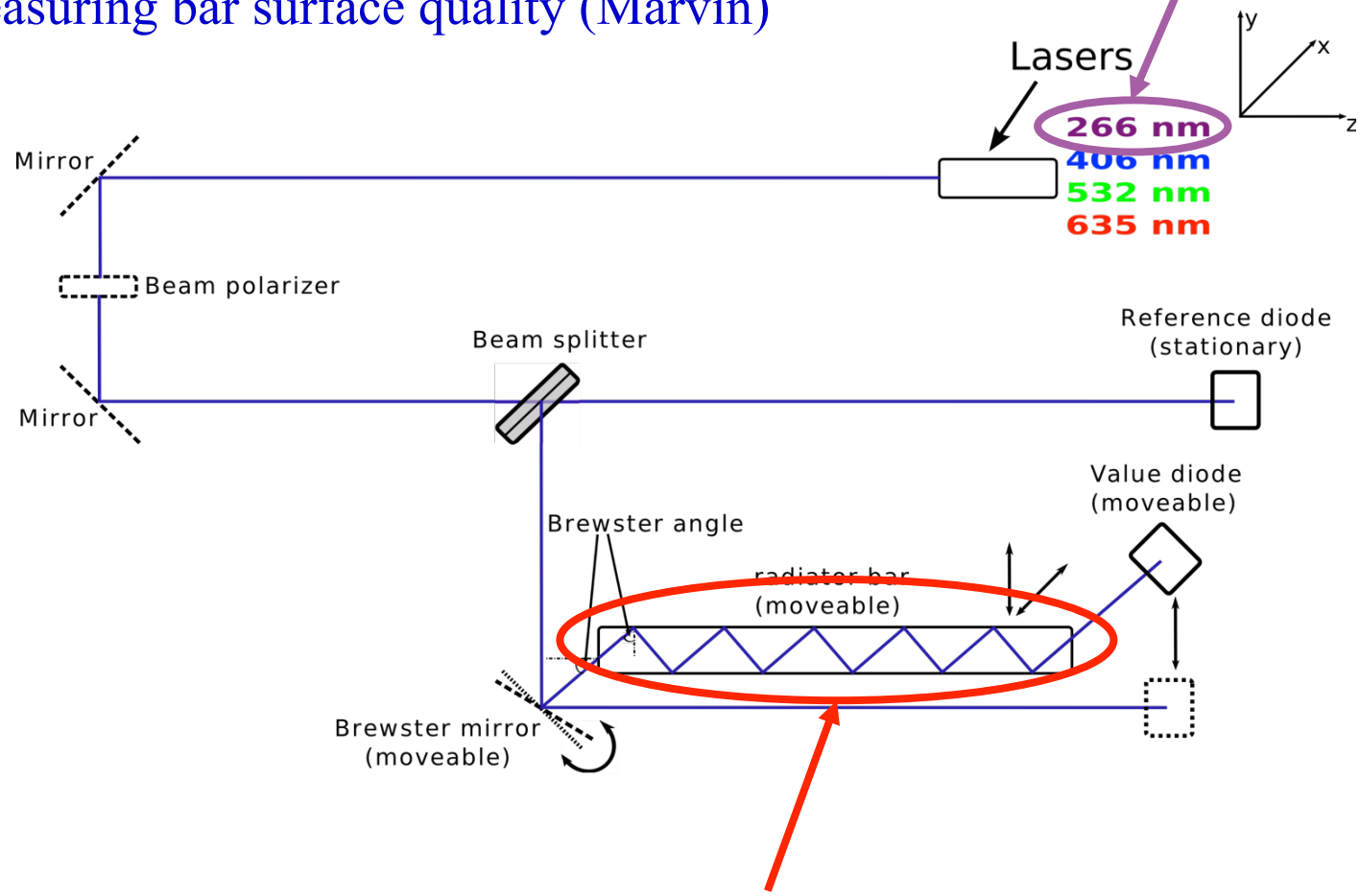


Results in presentation by Roman next.



Improved laser scanning setup in optical lab for measuring bar surface quality (Marvin)

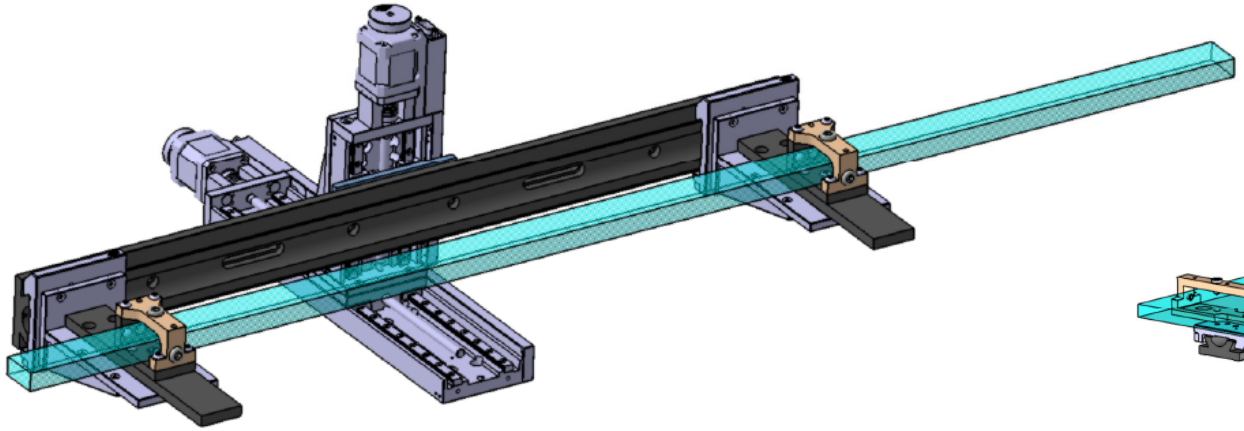
Ultraviolet laser added

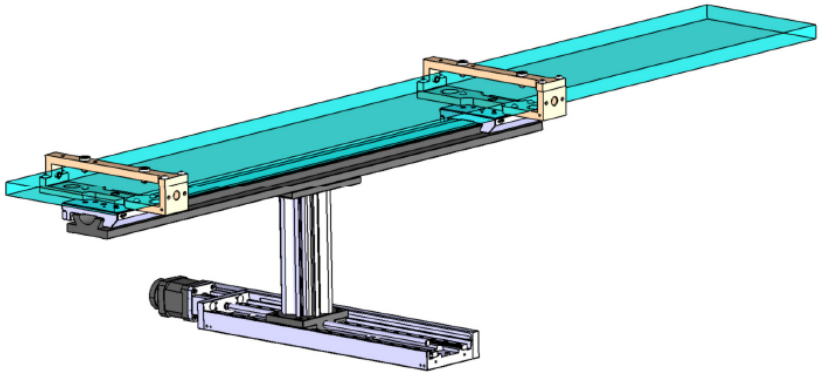


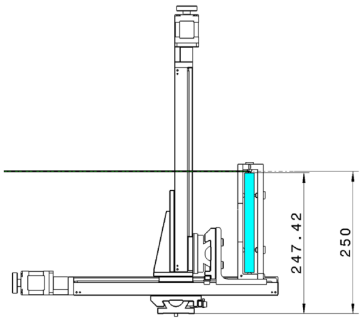
New bar support & horseshoes have been built (Andreas, Doro, Marvin)

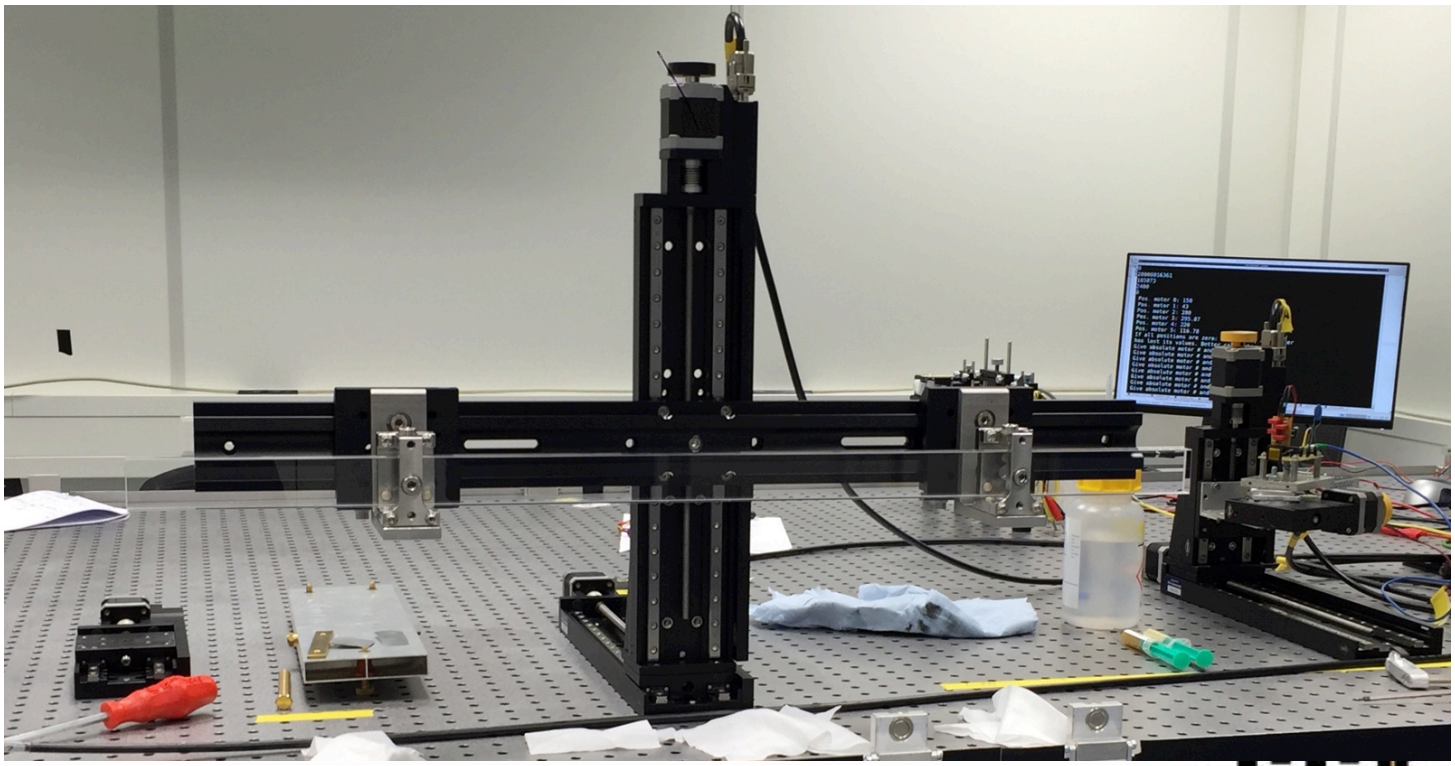
→ Setup stabilized, radiator changes are much faster/easier now

Optical Lab Update









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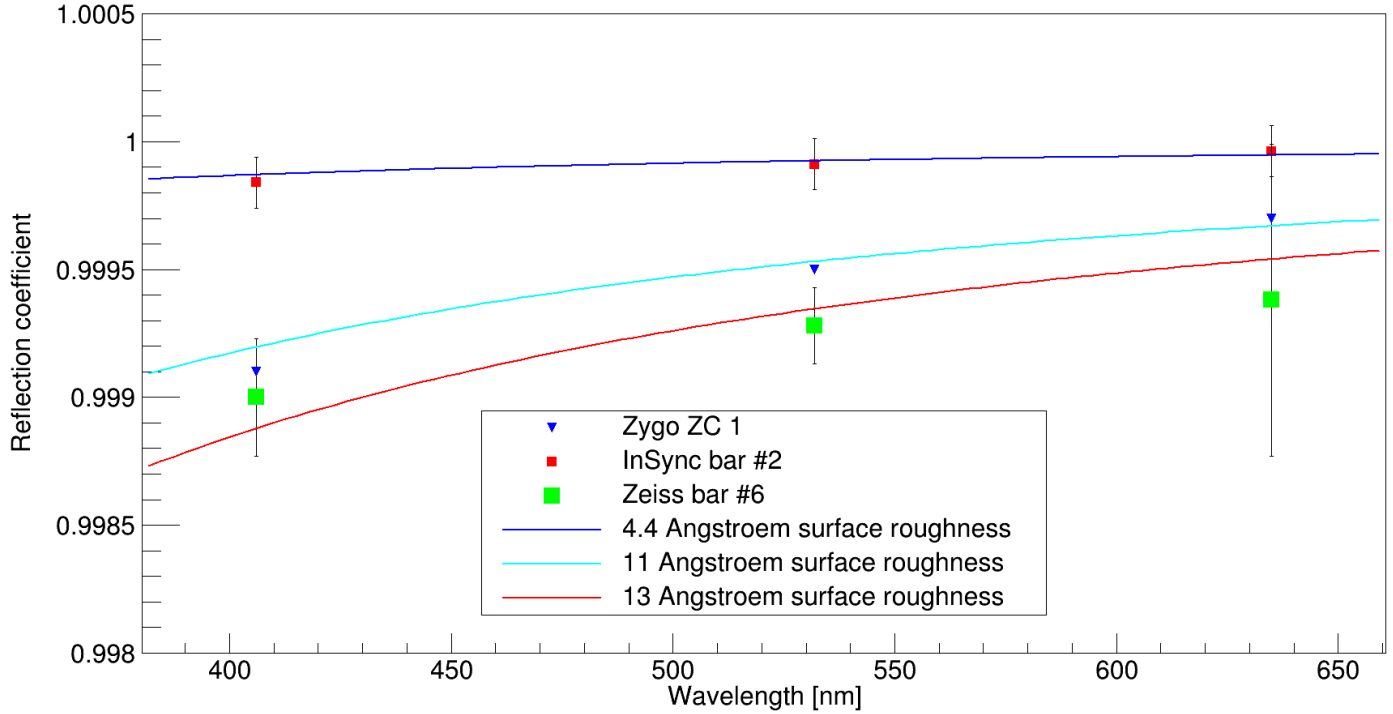


Internal reflection measurements for surface roughness determination have started

(3 wavelengths so far, UV laser needs safety approval)

Now measuring bars from InSync, Zeiss, Zygo, LZOS, Aperture/Okamoto.

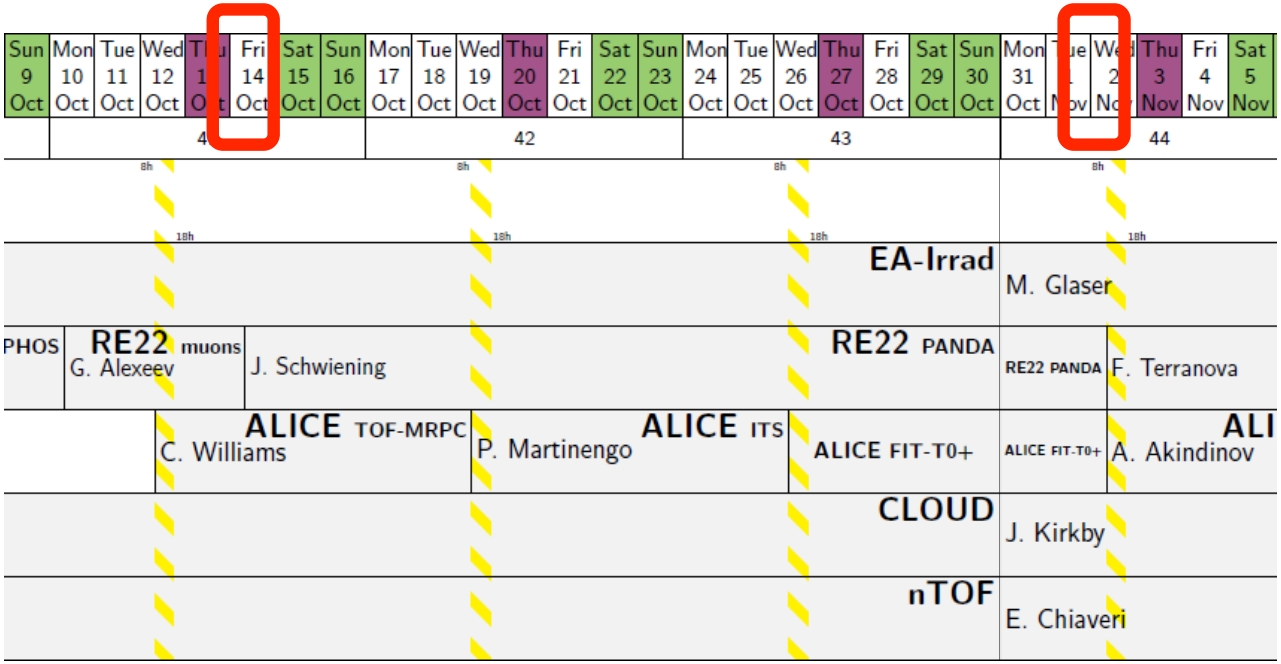
Soon plates from InSync and Nikon (delivery expected in late March).

Goal: validate potential vendors this summer for tendering next year.

Marvin will present a detailed report at June CollabMeet.

BEAM TEST UPDATE

CERN approved our beam test application, 19 days in Oct/Nov in T9.



Main goal of beam test for Barrel DIRC is the PID validation of the wide plate design.

This would require better timing resolution than performance achieved in 2015.

Barrel DIRC prototype needs to be improved/better understood, high-priority effort in electronics/prototype lab (Carsten et al), PADIWA mod tests in Mainz (Matthias, Matteo)

Will only go to CERN this year if required timing performance is demonstrated in lab.

Detailed presentation planned for June CollabMeet.

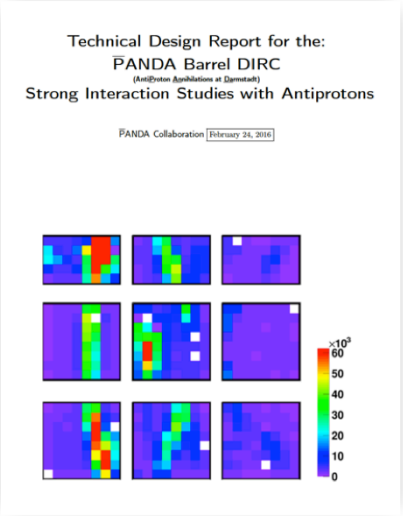
PANDA BARREL DIRC SCHEDULE

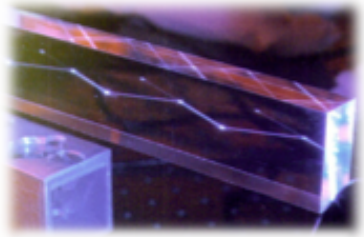
2015: Finalize R&D, validate design in test beam, write TDR draft.

2016: Finalize TDR, present at June CollabMeet and submit to FAIR.

2017-2020: Component Fabrication, Assembly, Installation.

- 2017: Finalize definition of production specs, initiate tender.
- 2018-2020: Industrial fabrication of fused silica bars and prisms.
  Industrial production of photon sensors.
- 2018-2019: Production and QA of readout electronics at GSI/Mainz.
- 2018-2020: Fabrication of bar containers and mechanical support frame,
  gluing of bars, construction of complete bar boxes.
  Detailed scans of all sensors in Erlangen.
  Assembly of readout modules in Mainz.
- 2020: Installation of mechanical support frame in PANDA
  insert bar boxes, mount readout modules.
  Ready as "Start Setup / Day One" detector.





DIRC bar with laser

Thank you for your attention.