STATUS OF THE GLUING LAB AT HIM

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On behalf of HIM-SPECF
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Overview

The PANDA Barrel DIRC:

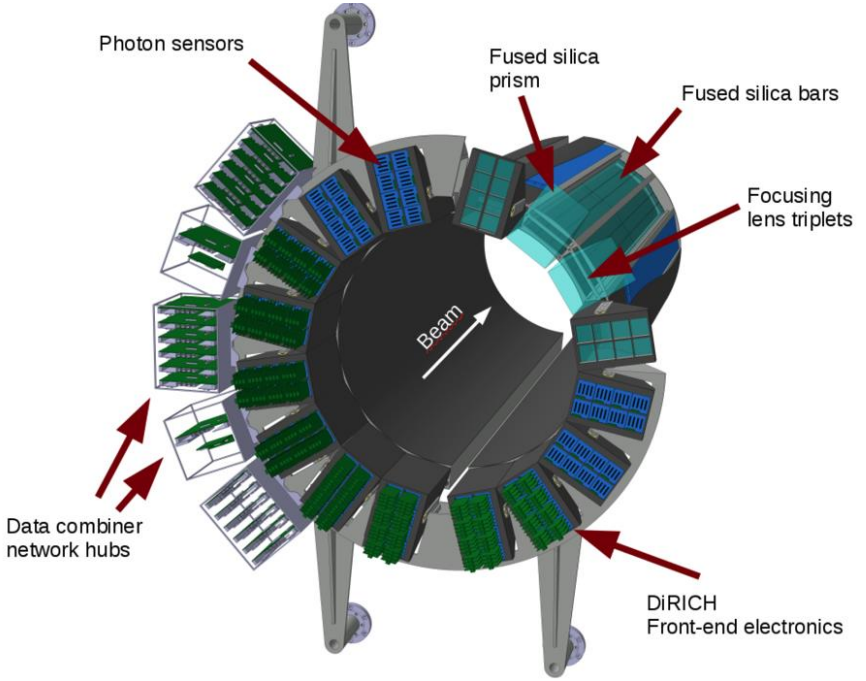
- Radiator: 48 bars (16 sectors)
- Compact expansion volume: 30cm-deep solid fused silical prisms
- Focusing optics: 3 layers spherical lens system

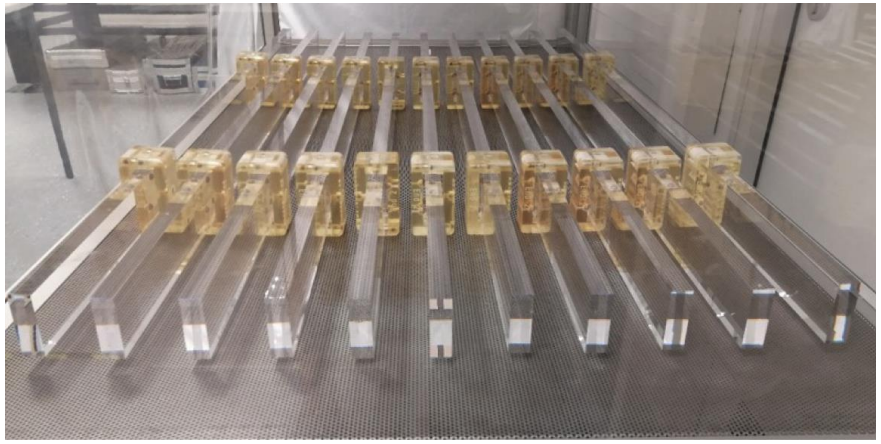
The bars:

- Highly-polished bar made of synthetic fused silica
- The squareness of the side-to face angles is less than 0.25 mrad and the total thickness variation is less than 10 μm.

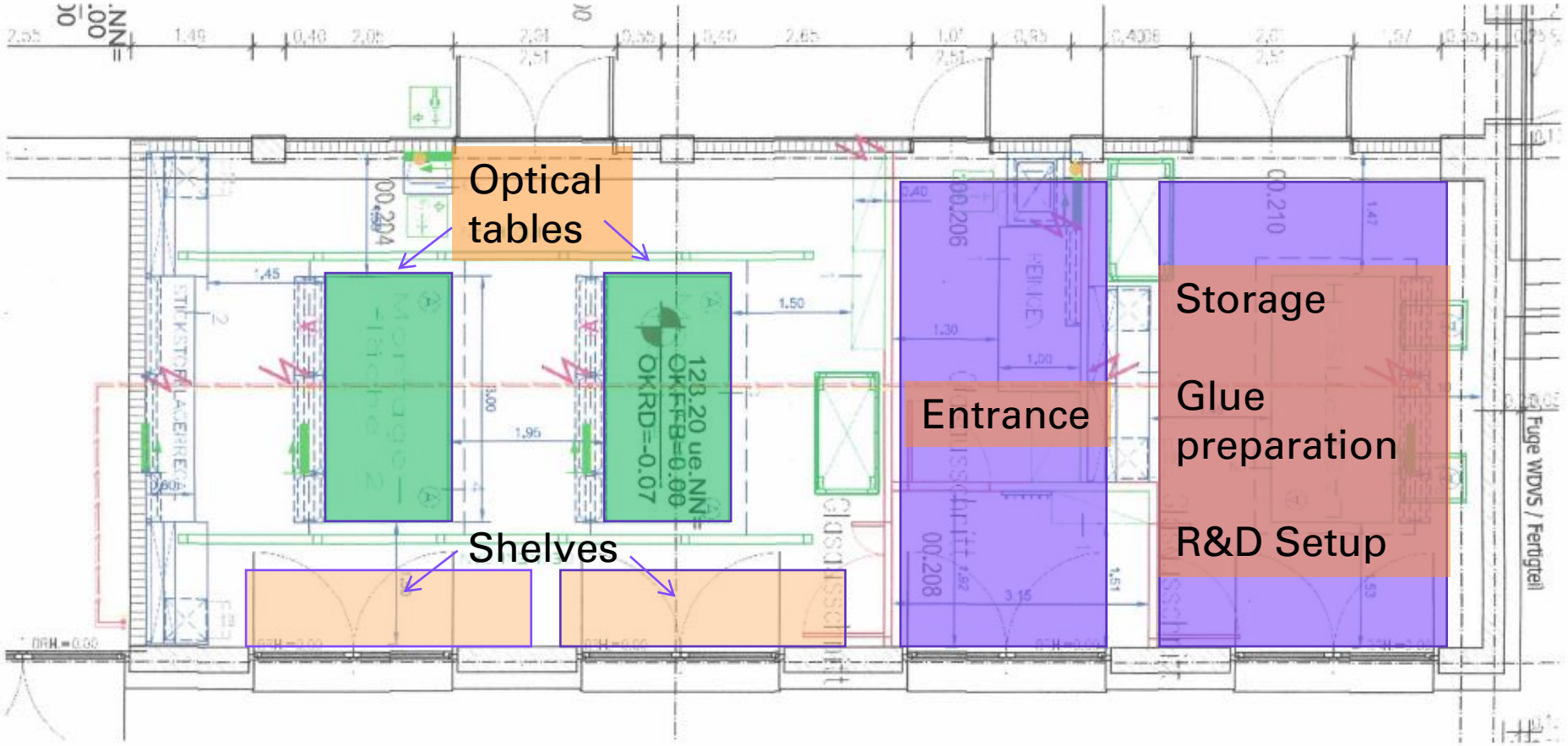
First task

- Two radiator pieces to be glued end-to-end to form a long bar, covering the full length of the Barrel DIRC 17mm (T) x 53mm (W) x 2400mm (L)



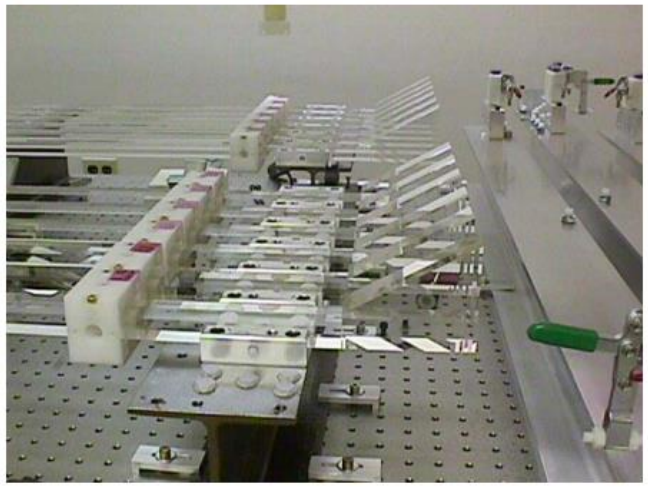


Gluing Lab at HIM

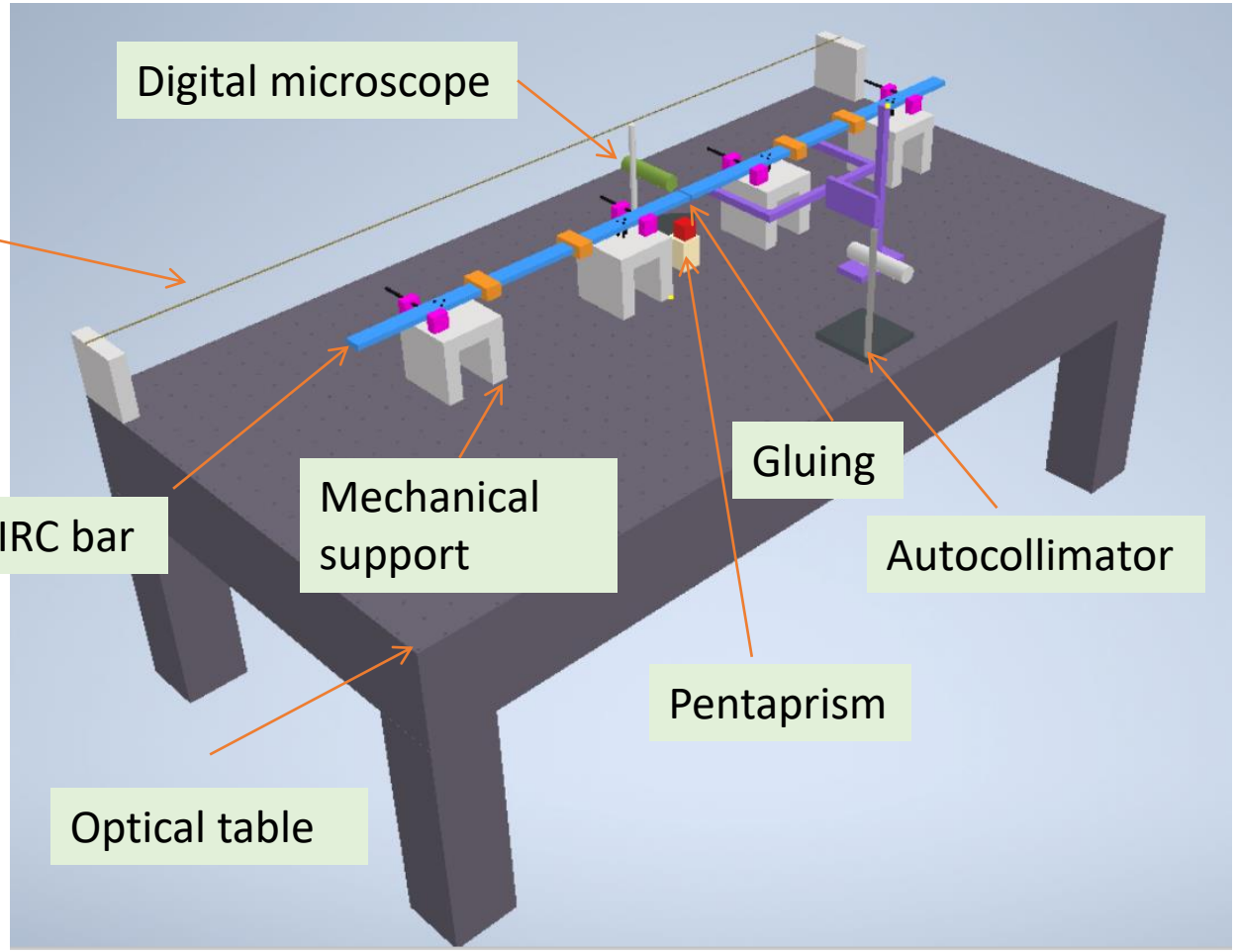


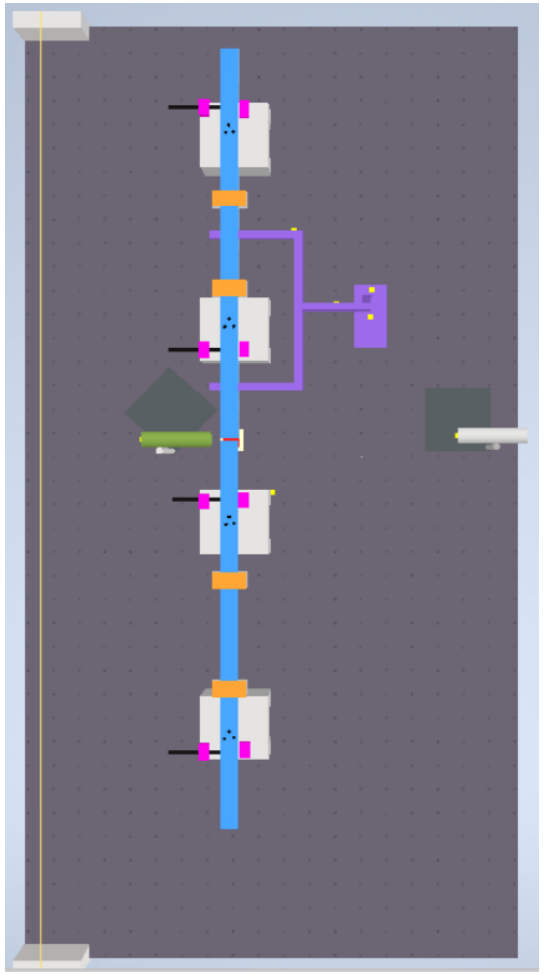
BaBar DIRC Gluing Setup

- PANDA Barrel DIRC gluing setup inspired by the BaBar DIRC gluing setup
- Photos of the bar gluing setup in the DIRC room at SLAC
- Large optical table and the DIRC bar support stations



Preliminary PANDA Barrel DIRC Gluing Setup





PANDA Barrel DIRC gluing setup inspired by the BaBar DIRC gluing setup

Bar Alignment

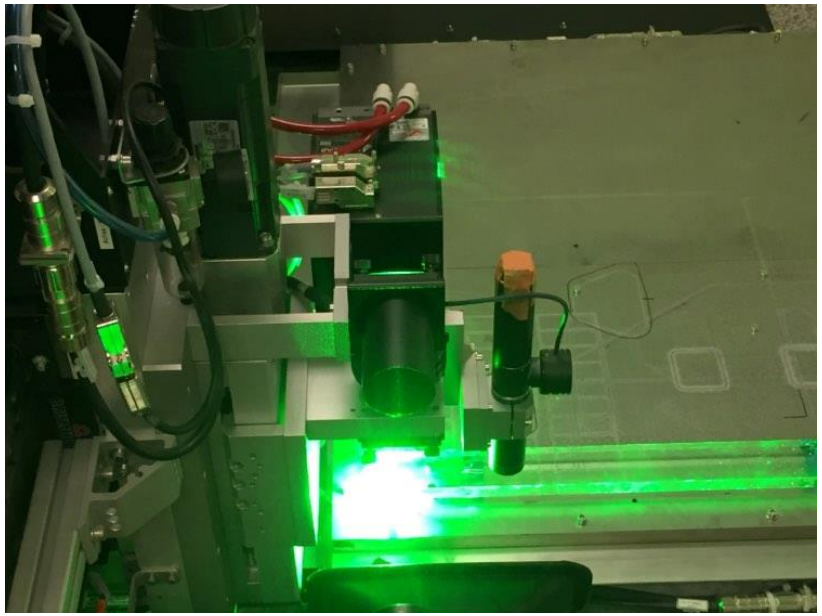
- Develop a procedure to minimize mechanical stresses during the gluing process and to maintain the parallelism between the bar ends
- Angular alignment: Using Nikon Autocollimator 6D-LED with a measuring accuracy of 0.5 seconds of arc
- Position alignment: Using highly tight piano wire. The positioning precision will be measured by a precision arm at HIM with measuring accuracy 30 micron.

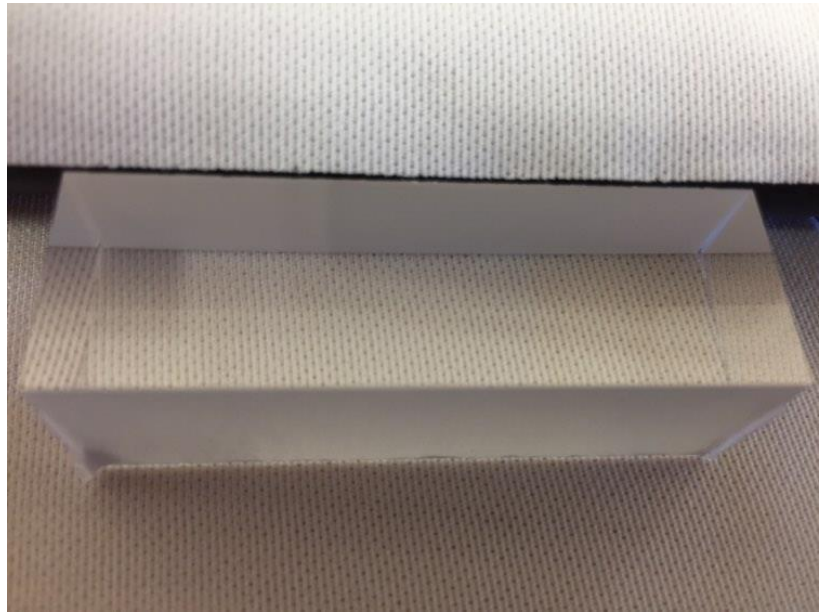
Testing samples

Many glue tests will be performed before the production phase, using glass samples and samples from Nikon bar after dicing

Glass samples

- Environmental conditions effect
- Optimizing shim thickness
- Bubbles removal techniques
- Optimize glue mixing ratio
- Mechanical strength





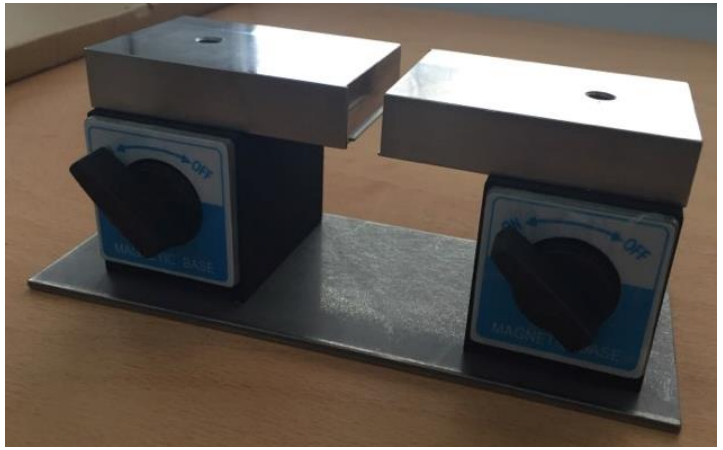
Dicing Nikon bar

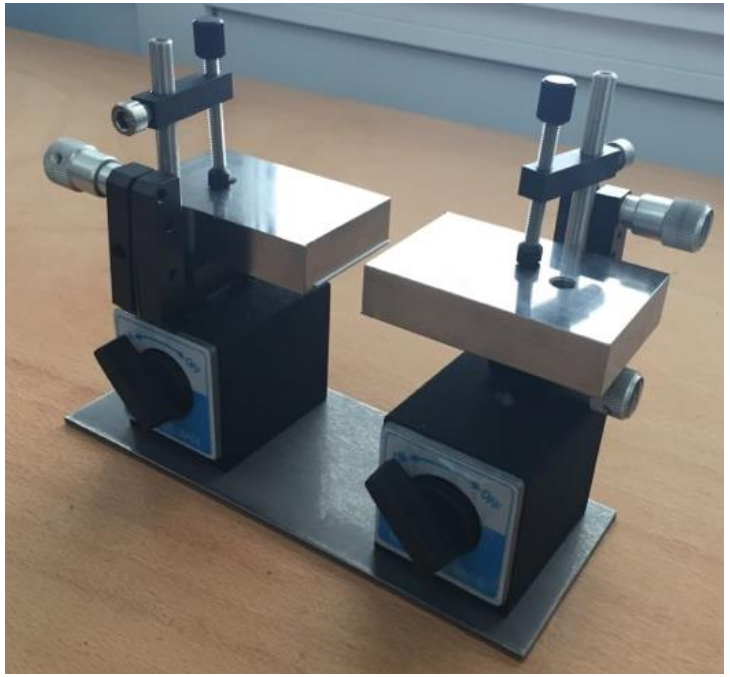
Nikon bar samples

- Test the glue in highly polished surfaces
- Advanced optical studies ?

R&D Setup

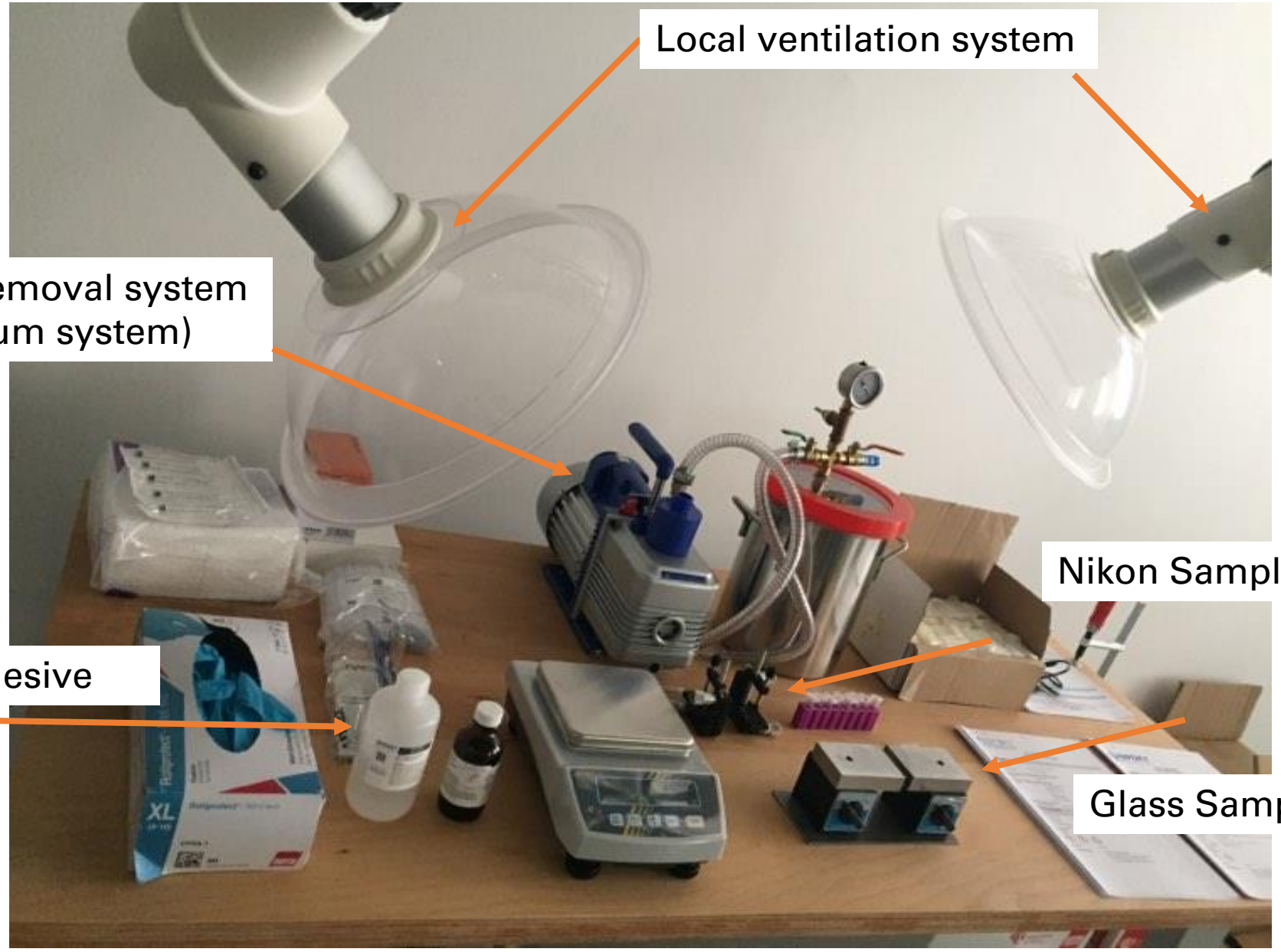
- Steel block with L shape edge 1mm to hold a glass sample. With m8 hole
- Glass sample has the same dimensions for the DIRC bar cross-section 2mm thick.
- Steel board 3mm thick used as a support structure
- Switch magnets used to fix the setup





- Setup for the Nikon blocks
- Angle adjustment capability
- Autocollimator can be used for angular fine tuning

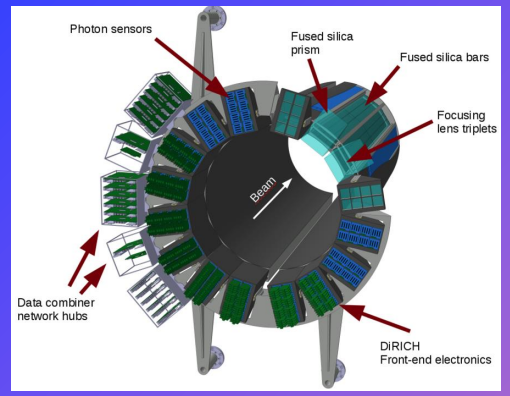
R&D Setup

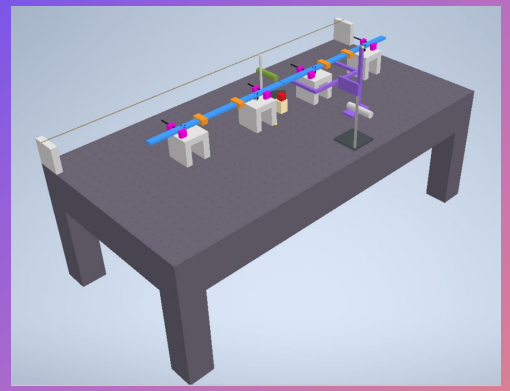

Local ventilation system
Bubble removal system
(vacuum system)
Nikon Samples Clamps
301-2 Optical Adhesive
Glass Samples Clamps

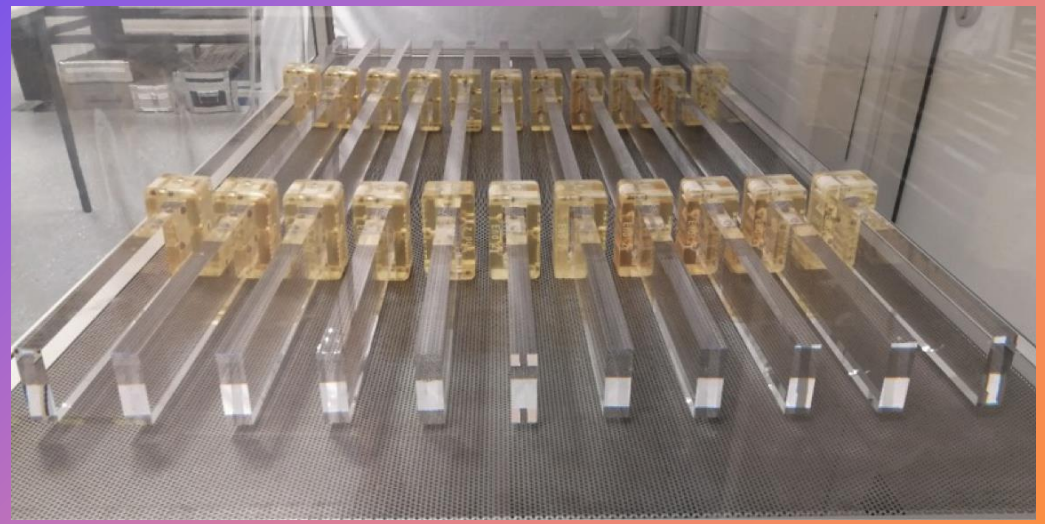
Next steps

- Optical table installation
- Fan filter replacement
- Get the autocollimator, pentaprism and first batch of bars from GSI
- Support structure final design
- Start the R&D gluing studies

Optical tables delivered at HIM







Summary

- PANDA Barrel DIRC gluing setup inspired by the BaBar DIRC gluing setup
- Most of the required equipment/tools are ready
- Start the R&D studies. Many glue tests will be performed before the production phase
- Goal: Two radiator pieces to be glued end-to-end with high quality with less than 30 micron misalignment error

Open questions

- At which extent, the optical probertites should be investigated …Spectrophotometer studies? Machinery and resources?

- Mechanical strength machinery ?

THANK FOR YOUR ATTENTION

Orders

- Two Thorlabs optical tables purchase claim confirmed by GSI. The tables expected to be delivered on May
- Autocollimator from GSI
- Pentaprism from GSI
- Humidity and temperature data logger from HIM

- Gluing Material (301-2 Optical Adhesive): On the claim
- R&D Shim: On the claim
- Digital Camera: On the claim
- Digital Microscope: On the claim
- Chemicals: On the claim
- Bar Clamps: On the claim
- Support structure: The drawing/requirements will be exported to the workshop at HIM. It is expected to be ready within 3 weeks after the optical tables installation

- Local ventilation system solution: final decision ongoing
- Glass samples to perform gluing tests: final decision ongoing
- Nikon bar dicing to perform gluing tests: final decision ongoing
- Bubble removal system (vacuum system): will be custom designed at HIM workshop

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