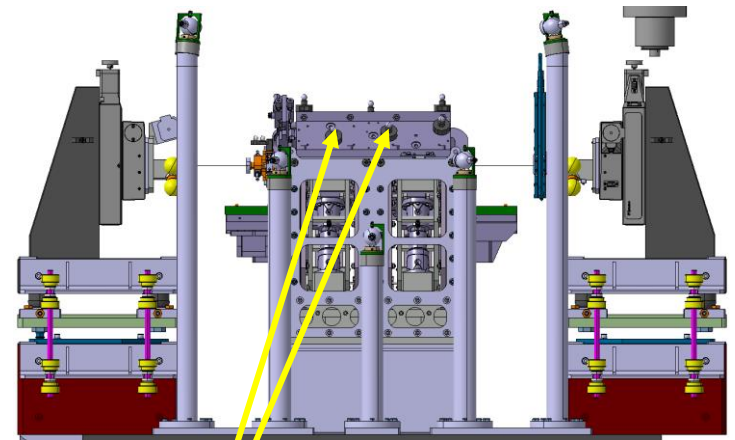

Back-up

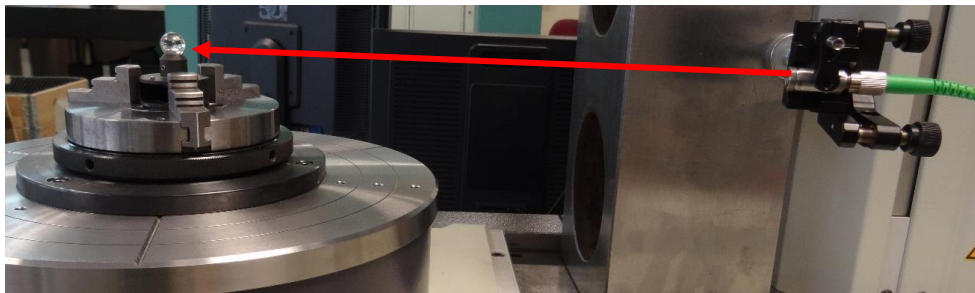
Back-up: *alignment speres*

- High index glass balls used as retro-reflectors in the MATHILDE alignment system developed for HIE-ISOLDE
- In the frame of the PACMAN (Particle Accelerator Components' Metrology & Alignment to the Nanometre scale) project
 - Same concept explored for FSI (Frequency Scanning Interferometry). Main goal: replace the standard corner cube shape retro-reflectors with balls
 - Coating to improve the intensity of reflected laser beam

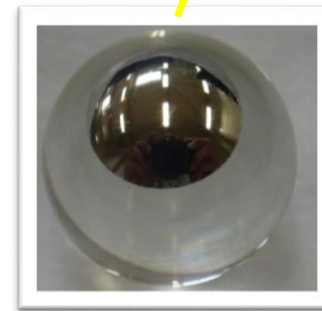


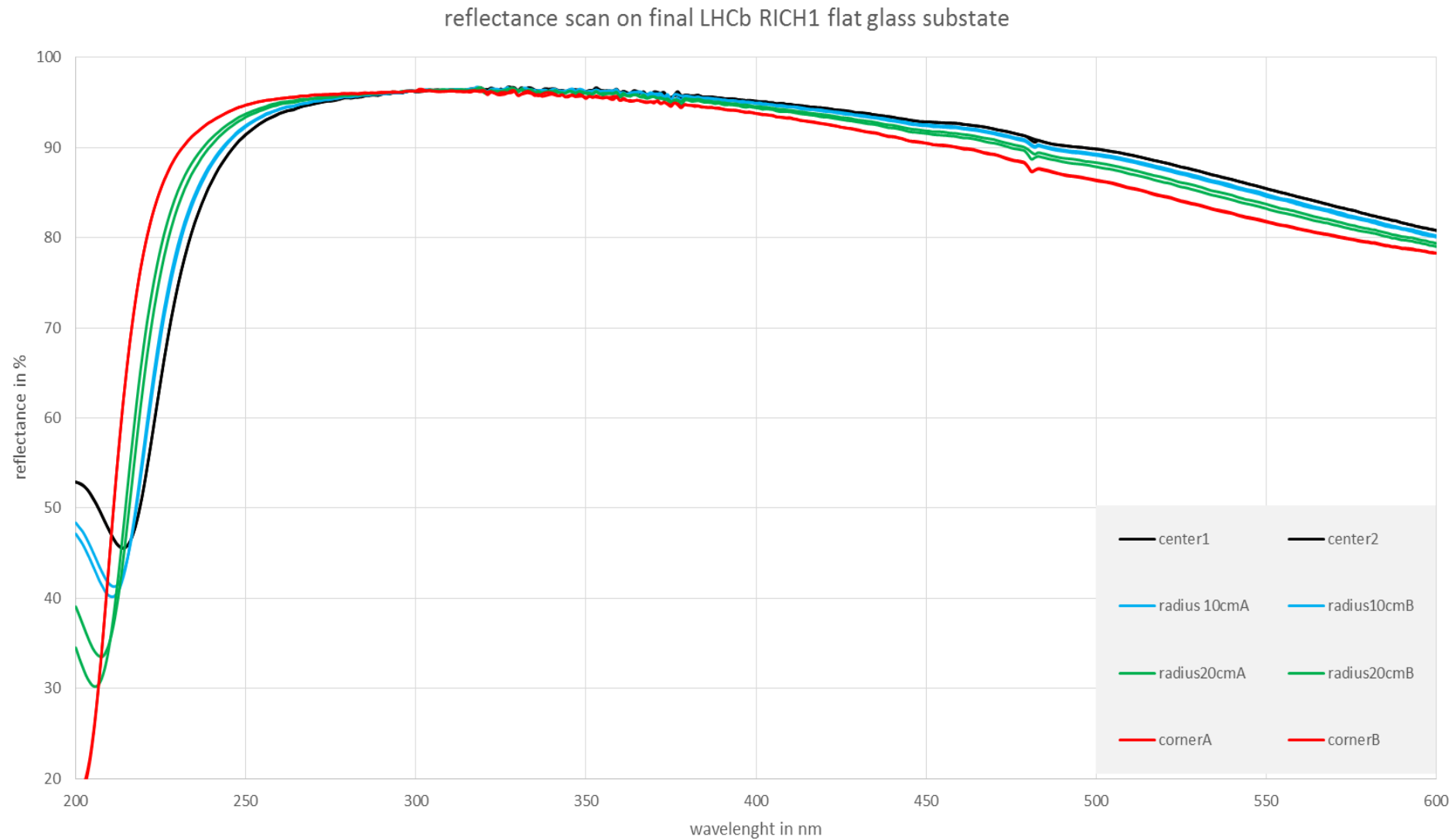
@Francois Morel

Coated Glass Balls
-> 0.5 inch target



Coated Glass Ball –Distance wmeasurement test ith FSI





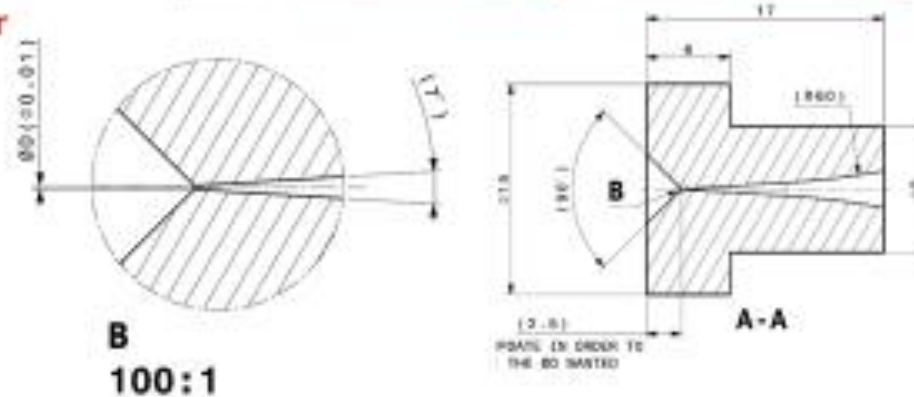


REALISATION MICRO BUSES



BUT: Fabriquer des micro buses avec un diamètre de 10 à 30 μm pour les expériences suivantes:

- LEAR
- AD
- ISR
- FAIR à Darmstadt
- PANDA à WW Munster
- Italie
- USA Fermilab



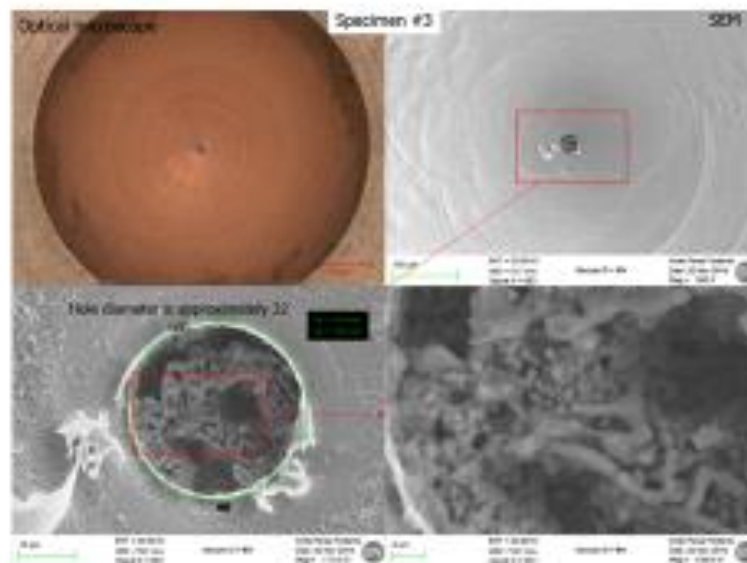
Plus fin au monde 40 microns



REALISATION MICRO BUSES



Processus de fabrication et contrôle



Back-up: *Microbuses*

EST-MF/NM/RK

Note technique EST-MF 96-05

Fabrication de microbuses

R. Kopp, N. Mézin

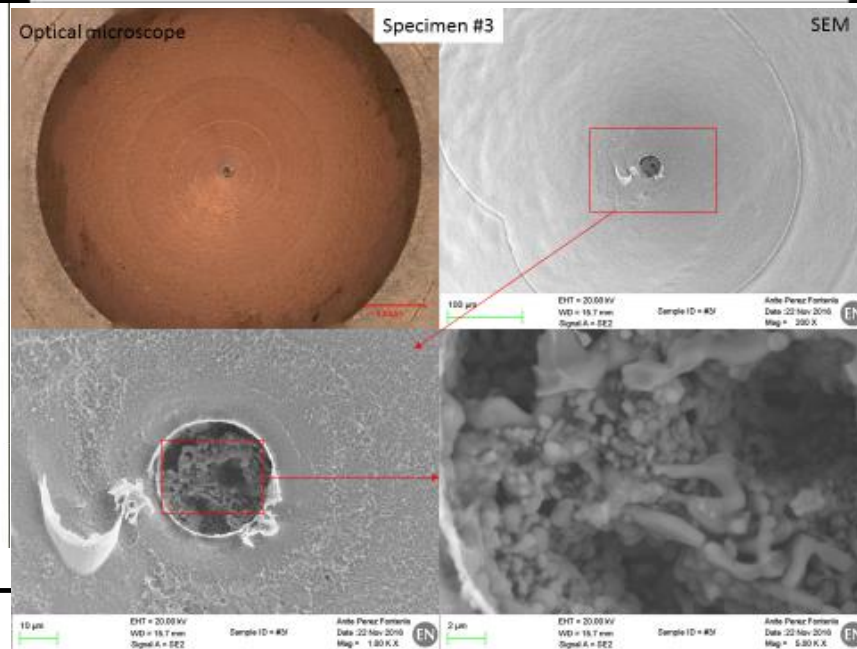
Description de la technique du procédé de fabrication de microbuses pour l'injection d'un micro-jet d'hydrogène dans les accélérateurs du CERN



Photo No. 1 - buses en cours d'élaboration

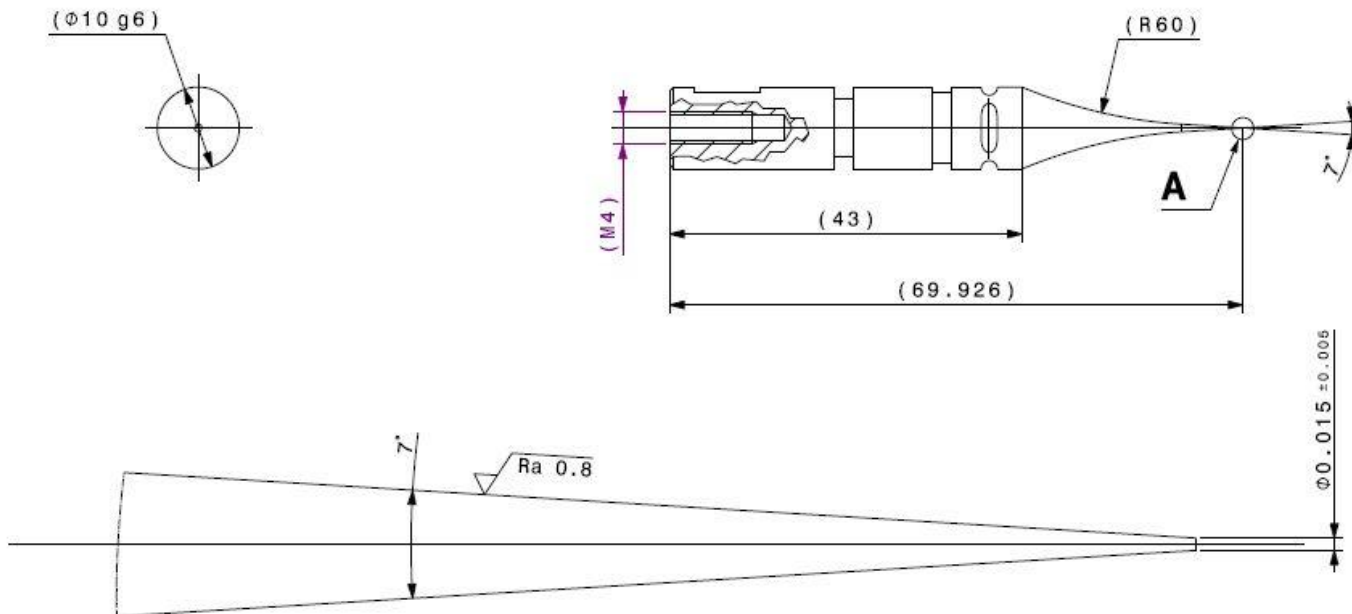
Genève, septembre 1996

Tool #21_Optical microscope



Back-up: Microbuses

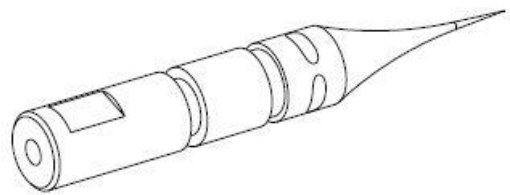
DRESSING, DIMENSIONS, TOLERANCES
 DRAWINGS, FINISHES, STANDARDS
 ACCORDING TO ISO STANDARDS
 PRODUCTION



A
200:1

UNLESS OTHERWISE MENTIONED, APPLICABLE ISO GPS STANDARDS ARE THOSE PRIOR TO 2010-08-01 REGARDLESS OF THE DRAWING DATE

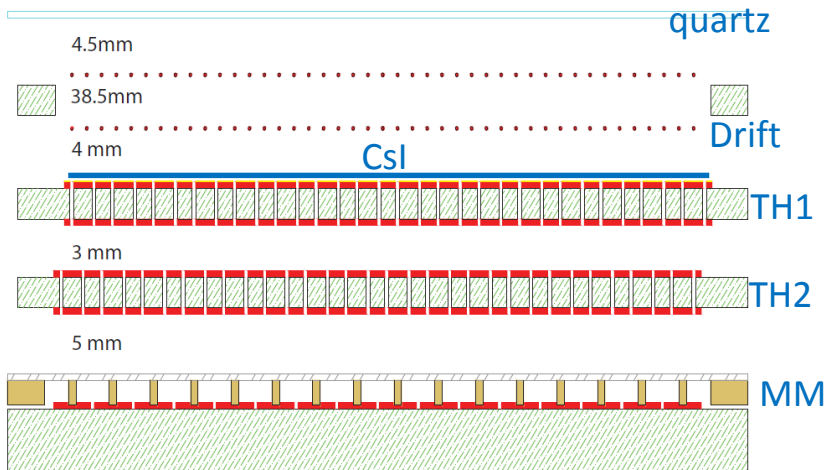
1	EBAUCHE MANDRIN ELECTROFORMAGE	1	Steel 115CrV3 (1.2210)	CRNHZMW_2342 ST0628676	
QJA	DESCRIPTION	POS	MAT.	OBSERVATIONS	REF.CERN
ENS / ASS			S. ENS / S. ASS		
ISO 2768-mK	√ Ra 3.2	ISO 13715		-0.3	-0.3
Work shop tools				DRAWN	P. SECOUET 2014-09-19
FINITION MANDRIN ELECTROFORMAGE				SCALE	CONTROLLED
				2:1	RELEASED
				APPROVED	
				CAD Document Number	ST0628631_02
				REPLACES	
NON VALABLE POUR EXECUTION NOT VALID FOR EXECUTION			DAC	-	
CRNHZMW_2343				SIZE	IND.
				3	



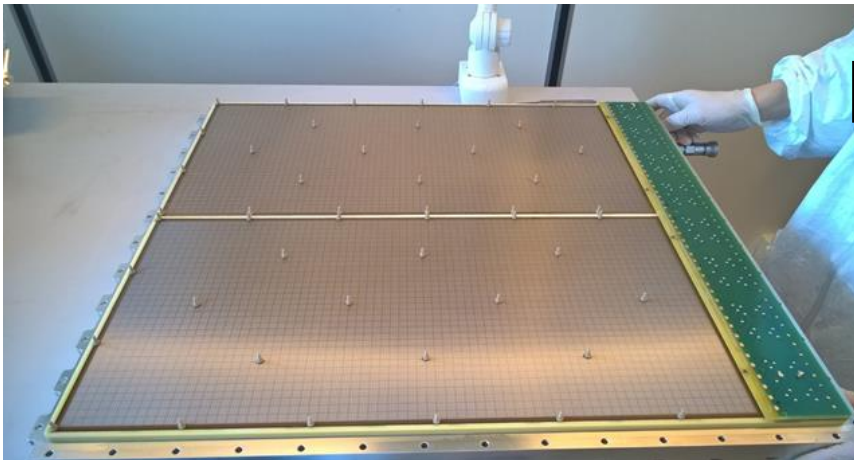
ORGANISATION EUROPÉENNE POUR
 LA RECHERCHE NUCLEAIRE
 EUROPEAN ORGANIZATION FOR
 NUCLEAR RESEARCH
 CERN
 LE BACCAL DE MISE AVEZ ILLUSTRÉ E BAC JUS COMMERCIALISE SANS REPRODUCTION AUTOMATIQUE
 THIS DRAWING MAY NOT BE REPRODUCED OR TRANSMITTED IN ANY FORM OR BY ANY MEANS WITHOUT WRITTEN PERMISSION

The new hybrid THGEM+Micromegas PDs

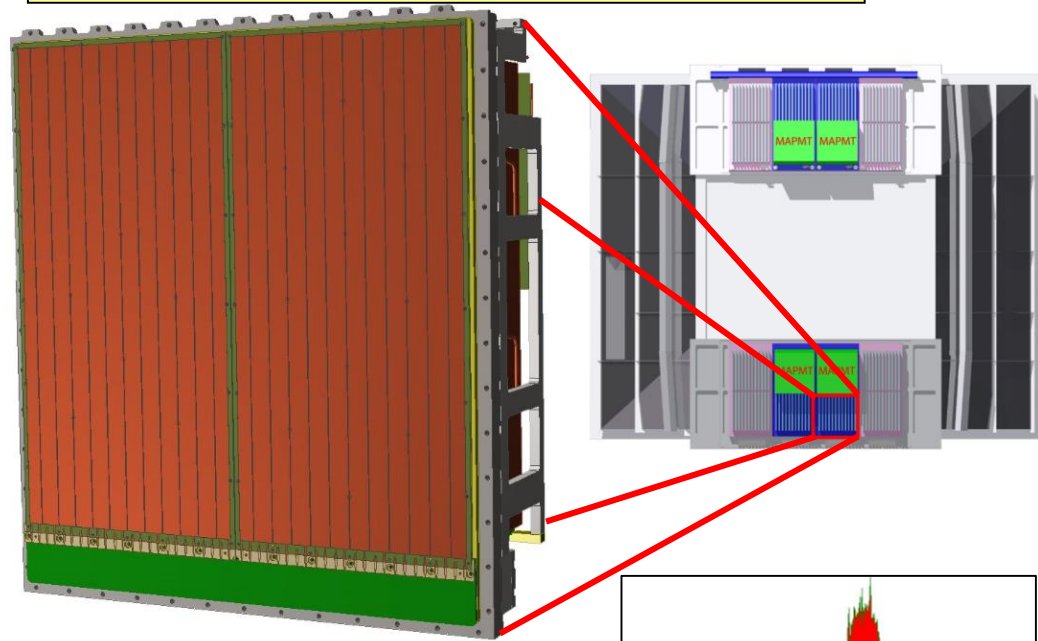
Hybrid PD scheme



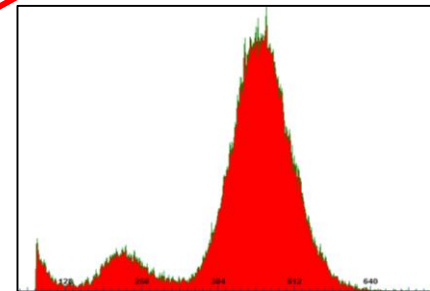
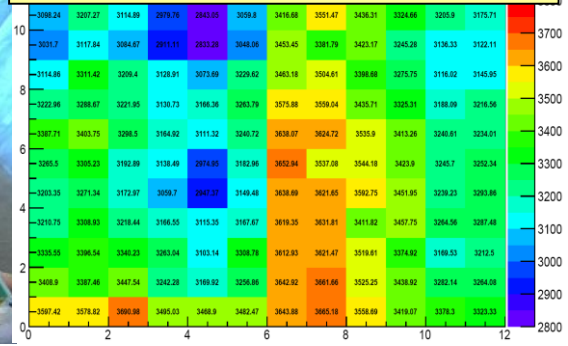
Standard Bulk Micromegas produced at CERN



modular structure: one module = 600x300 mm²



good Micromegas gain uniformity



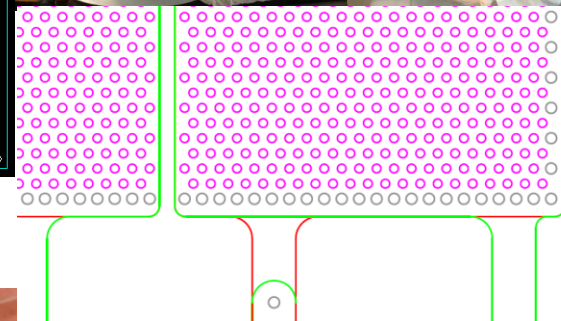
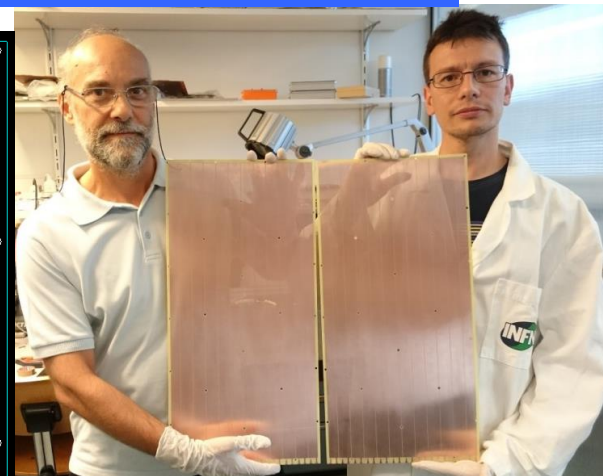
$$\delta_G = \frac{G_{max} - G_{min}}{G_{min}} < 5\%$$

The COMPASS THGEM design

Thickness: 0.4 mm, hole diameter: 0.4 mm, pitch: 0.8 mm

12 sectors on both top and bottom, 0.7 mm separation

24 fixation points to guarantee THGEMs flatness



border holes diam.: 0.5 mm

pillars in PEEK

CsI QE measurement

19 CsI evaporations performed in 2015 - 2016
on 15 pieces: 13 THGEMs, 1 dummy THGEM,
and 1 reference piece (best from previous coatings)

11 coated THGEMs available, 8 used + 3 spares

$$I_{Normalized} = \frac{I_{CsI} - I_{CsI_{Noise}}}{I_{Ref} - I_{Ref_{Noise}}}$$



THGEM number	evaporation date	at 60 degrees	at 25 degrees
Thick GEM 319	1/18/2016	2.36	2.44
Thick GEM 307	1/25/2016	2.65	2.47
Thick GEM 407	2/2/2016	2.14	2.47
Thick GEM 418	2/8/2016	2.79	2.98
Thick GEM 410	2/15/2016	2.86	3.14
Thick GEM 429	2/22/2016	2.75	2.74
Thick GEM 334	2/29/2016	2.77	3.00
Thick GEM 421 re-coating	3/10/2016	2.61	2.83
Reference piece	7/4/2016	3.98	3.76

$$\frac{\pi}{2\sqrt{3}} \left(\frac{d}{p}\right)^2$$

QE measurements indicate an average THGEM QE = 0.73 x Ref. piece QE, in agreement with expectations (THGEM optical transparency = 0.76)

Thanks to Thomas Schnider and Miranda Van Stenis

COMPASS RICH I Upgrade: Hybrid THGEM + MM with CsI

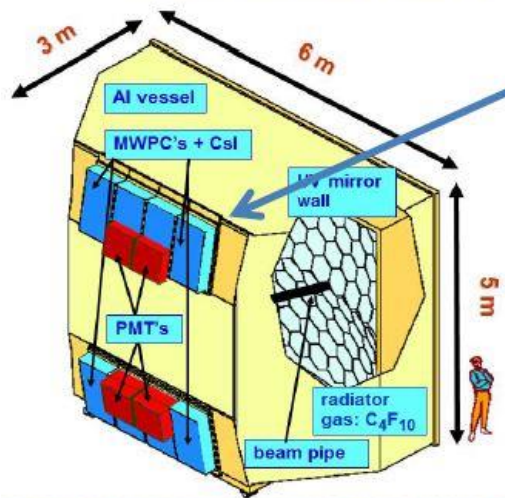
COMPASS RICH I: 8 MWPC with CsI since 2000

F. Tessarotto

8 Years of Dedicated R&D: THGEM+ CsI

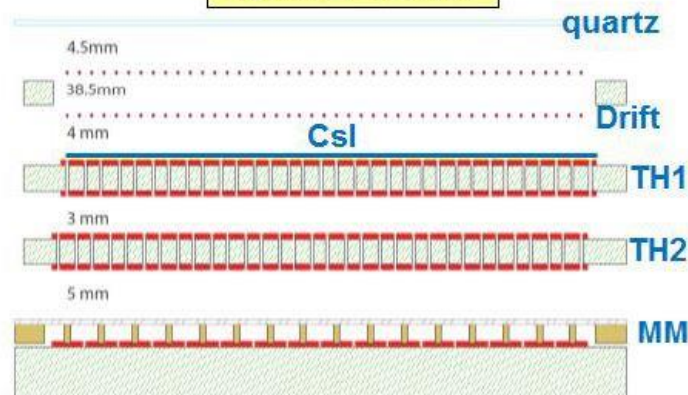
MWPC's + CsI

New Hybrid THGEM + MM PDs:



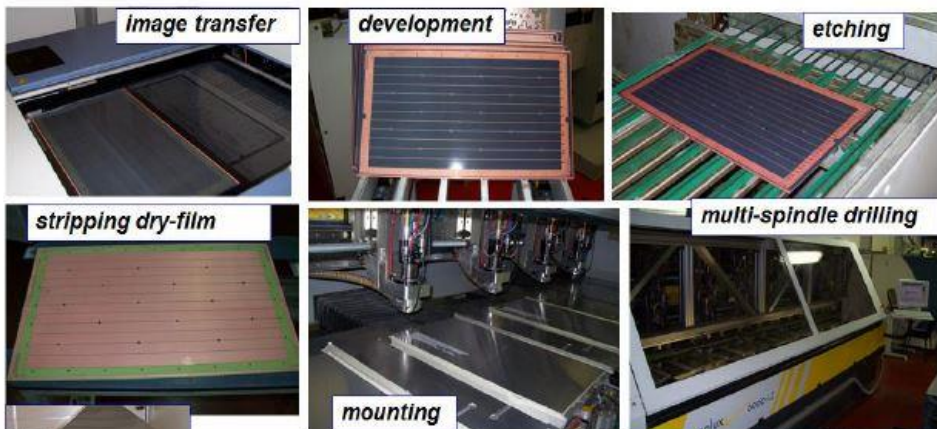
MWPC+CSI:
successful but with performance limitations for central chambers

Hybrid PD scheme

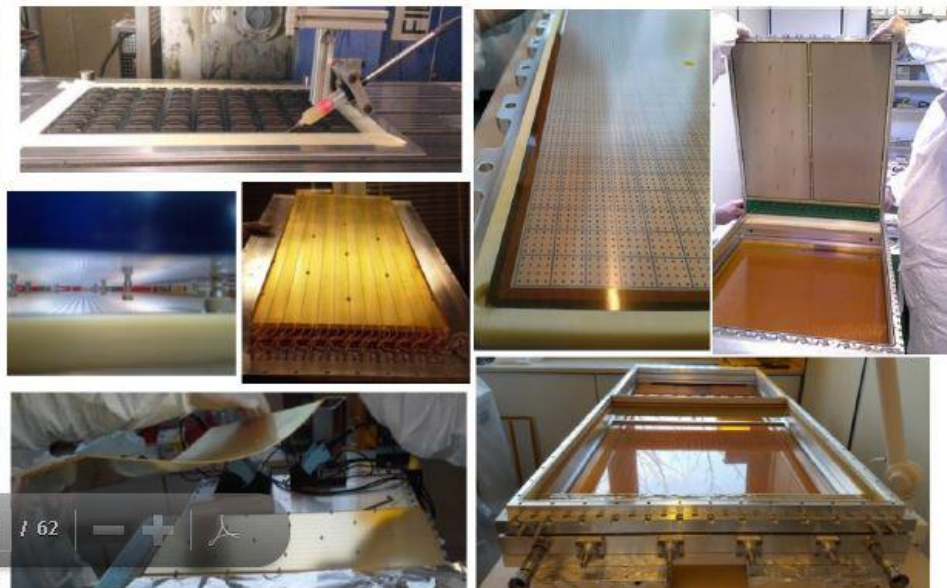


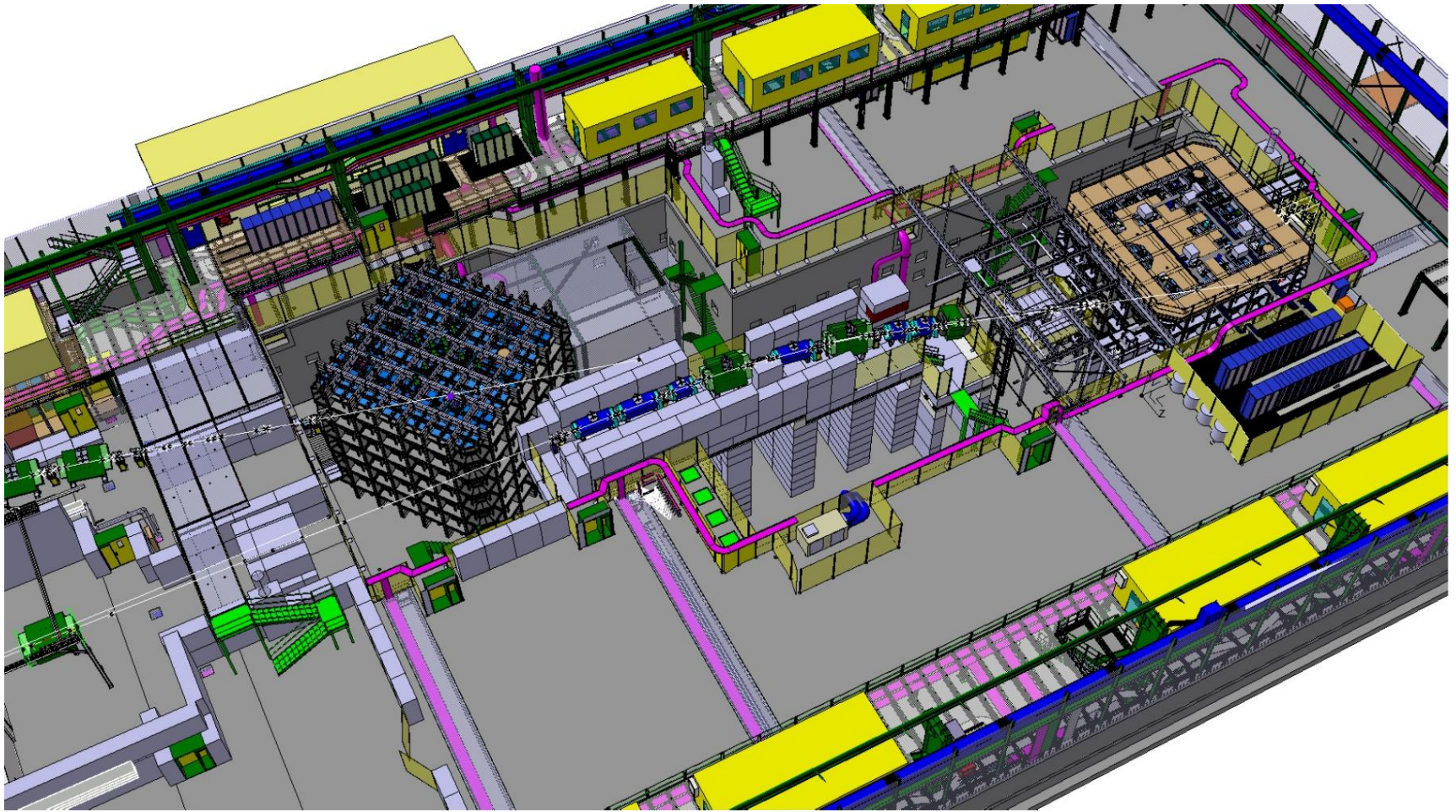
Production THGEM @ ELTOS:

Assembly of Hybrid THGEM +MM:



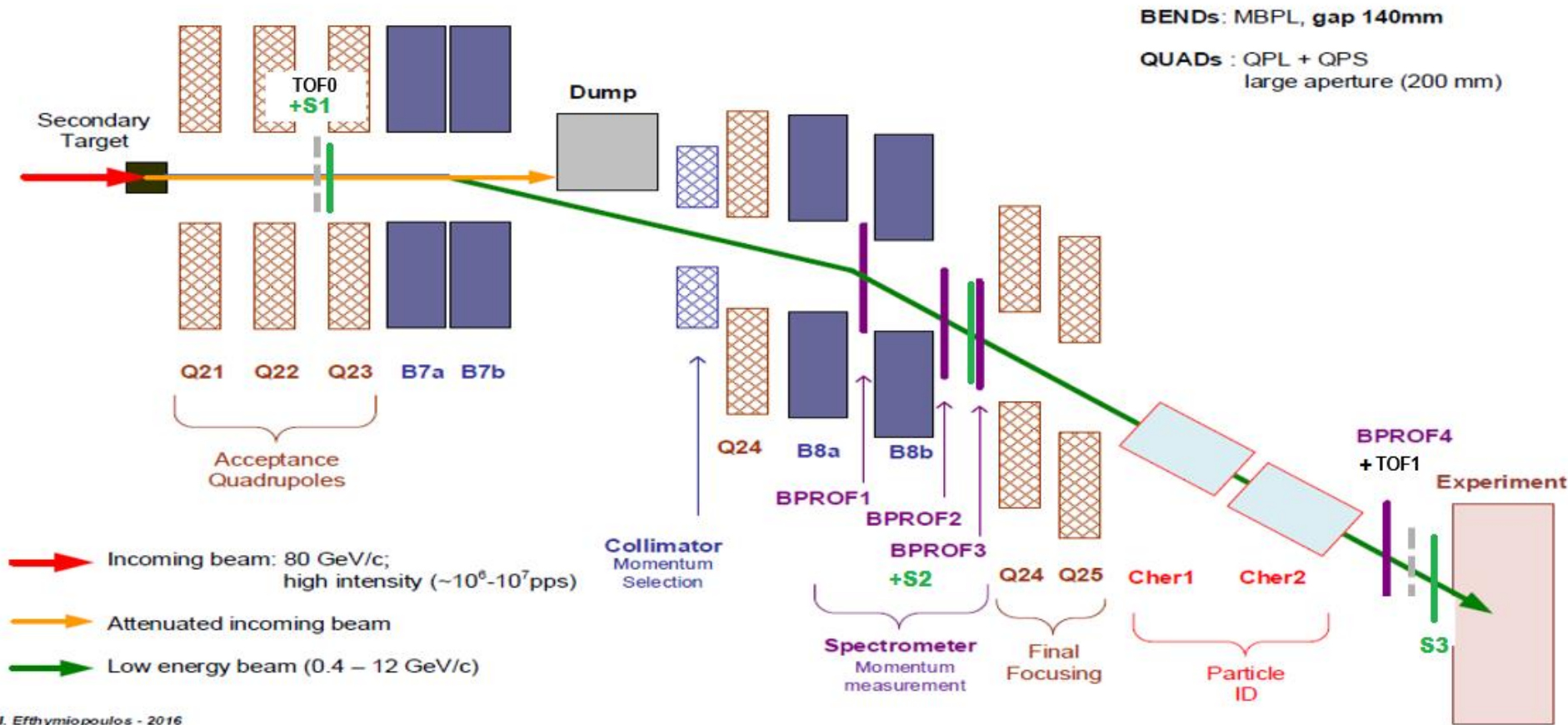
In Trieste a specific cleaning procedure is applied : polish with fine grain pumice powder, pressure water cleaning, ultrasonic Bath with Sonica PCB solution (PH11), distilled water rinsing and oven @ 160 °C





- Secondary beams of hadrons (p^\pm , π^\pm , K^\pm) and leptons (e^\pm , μ^\pm) of very low energies (0.5 to 12 GeV) and intensities (10^3 particles/spill maximum).
- Individual particle detection required: profile, intensity, spectrometry, ToF.
- Large area detectors: 20 cm x 20 cm.
- First prototype ready for September 2017. Beam tests foreseen in the East Area in October/November. A total of 26 detectors ready for mid-2018.

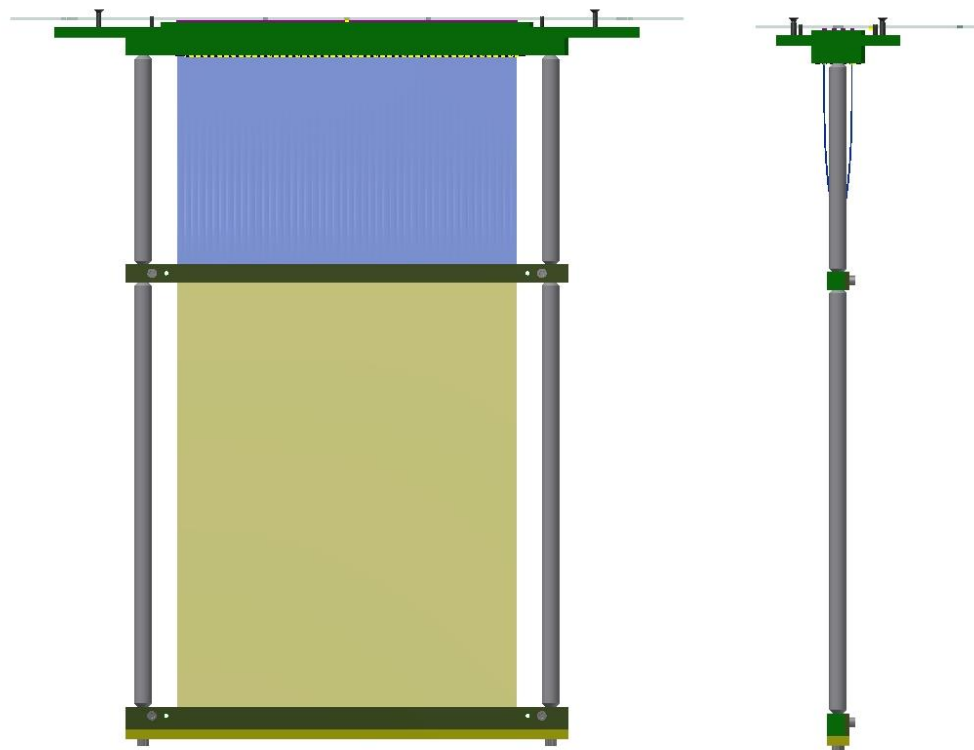
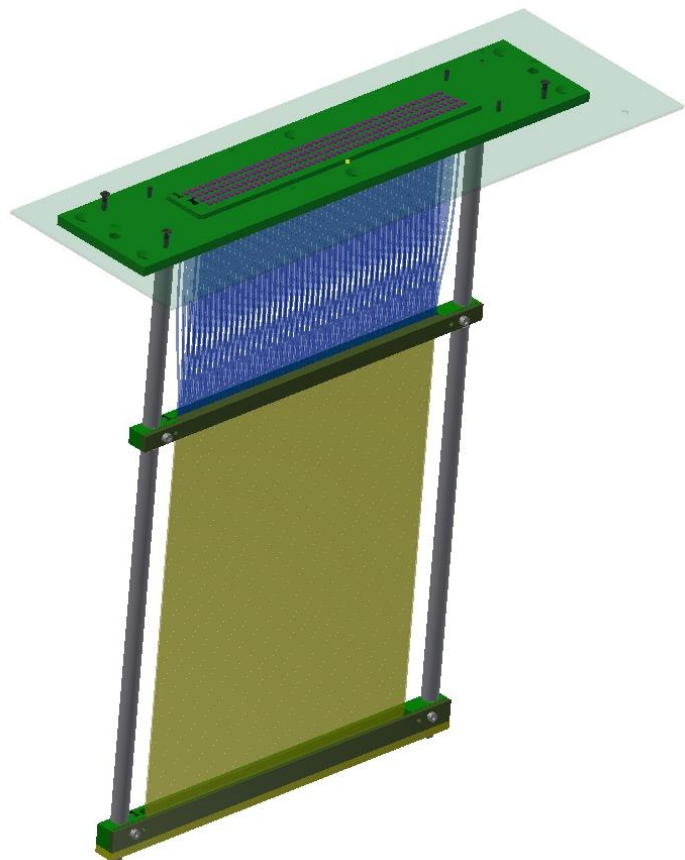
EHN1 Extension - H2 VLE Beam Schematic Layout



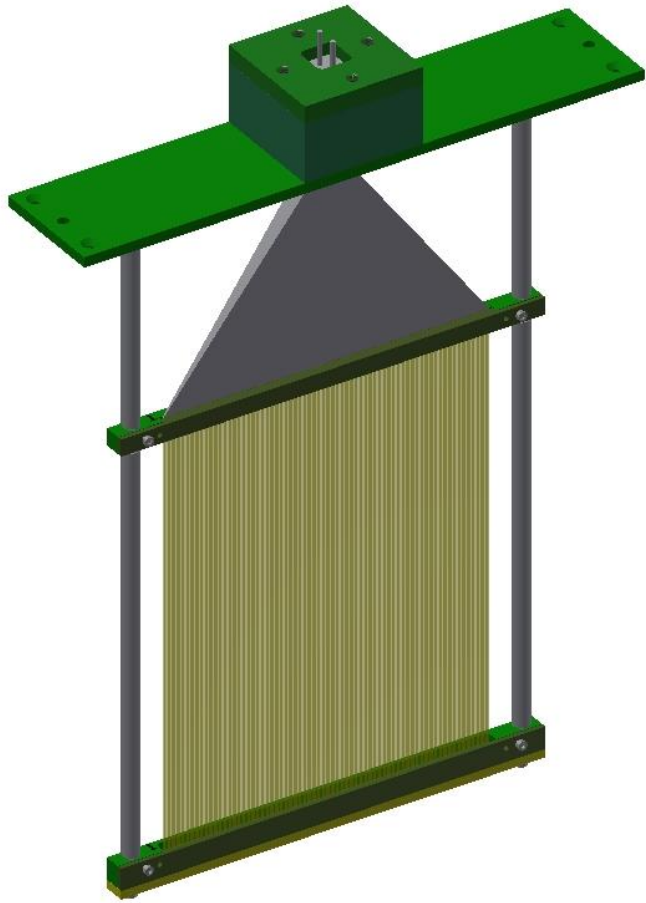
The layout for H4 is slightly different but involves an equal number of detectors.

Proposed instrumentation:

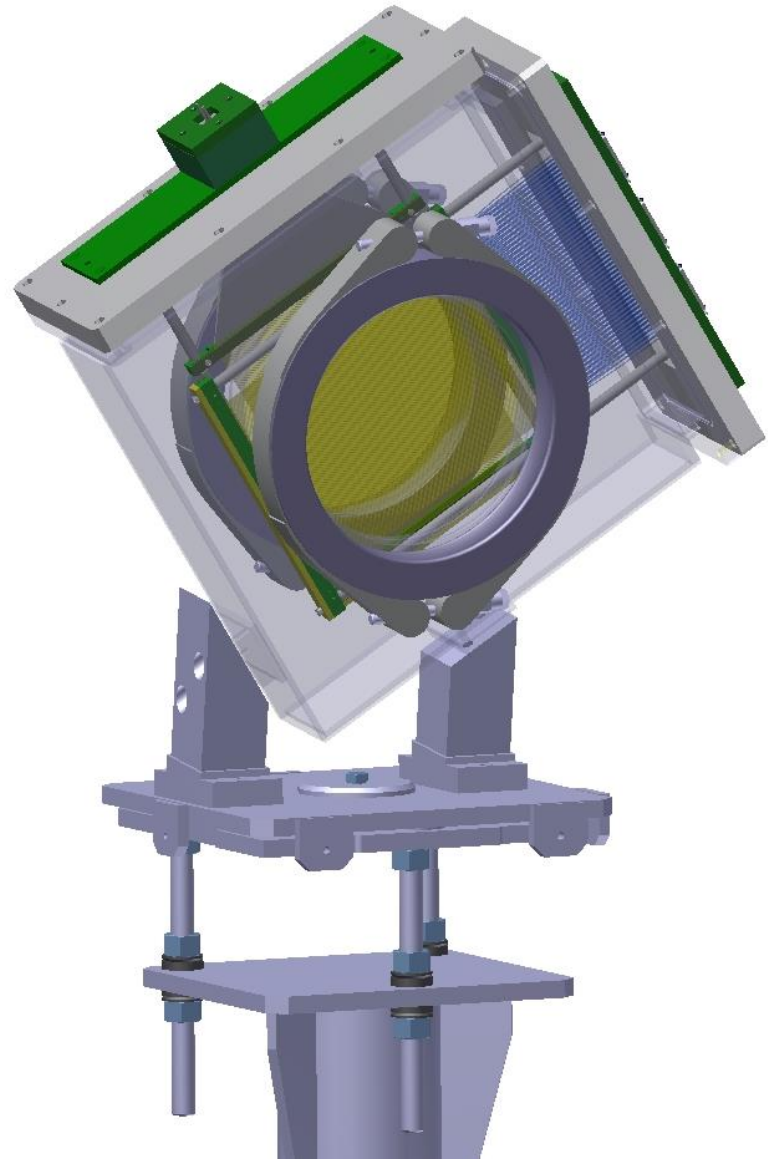
- scintillating fibres read out by silicon photomultipliers (XBPF)
- Scintillating fibres read out by photomultiplier tubes (XSCINT)



XBPF

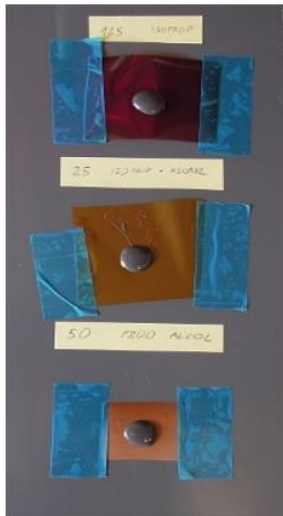


XSCINT



New technical fellow (Jonathan Franchi), under supervision of Thomas Schneider (EP-DT), has done an investigation on glues and thin foils to assemble the fibres

3M DP190



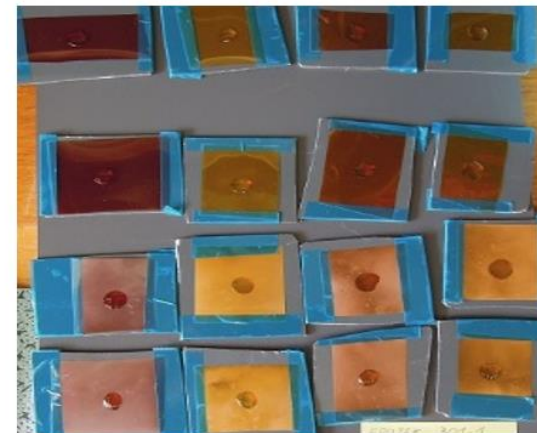
Araldite
2011



Araldite
2020



EJ-500



301-1
Epotek

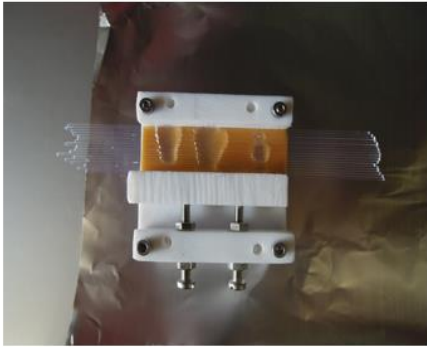
21/04/2017

Jonathan Franchi CERN EP-DT-EF

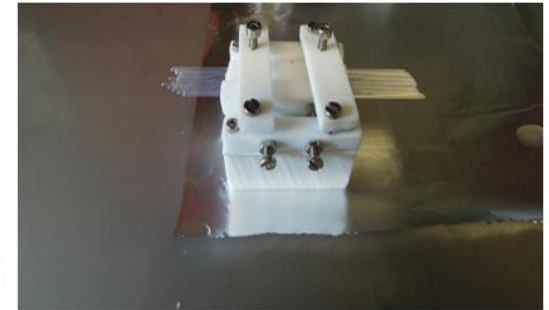
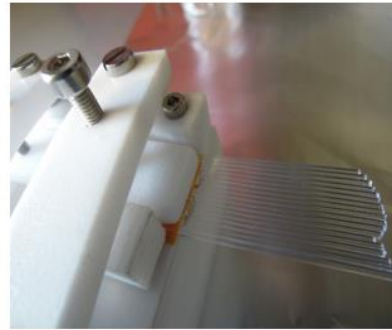
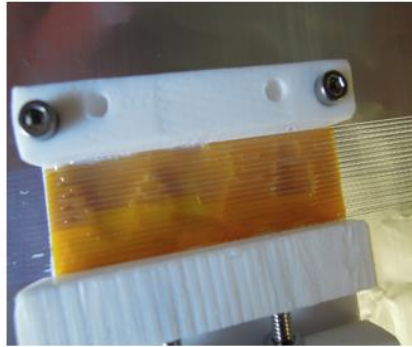
8

EJ-500 epoxy resin with 25µm kapton foil is the best combination

From a small prototype



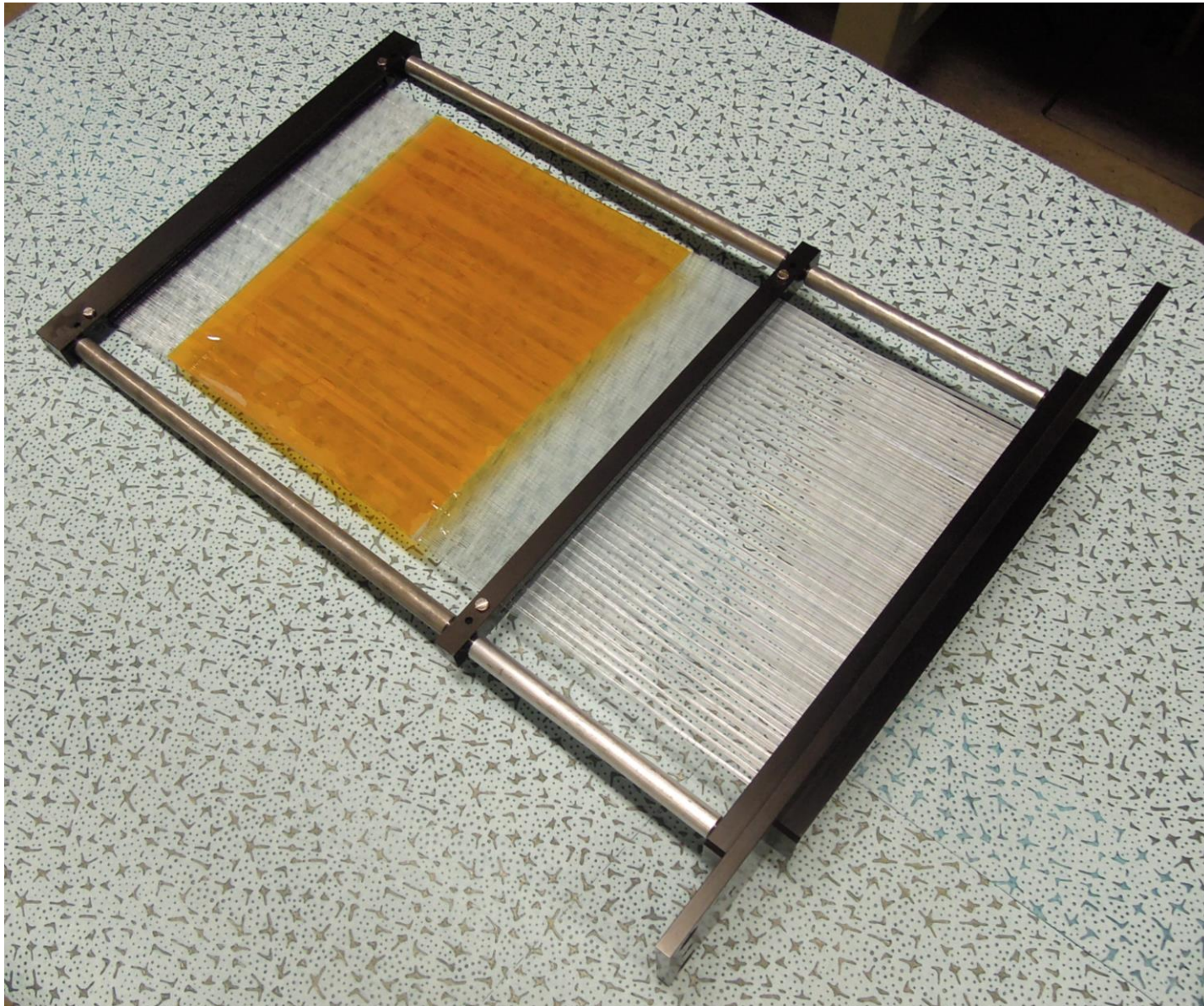
21/04/2017



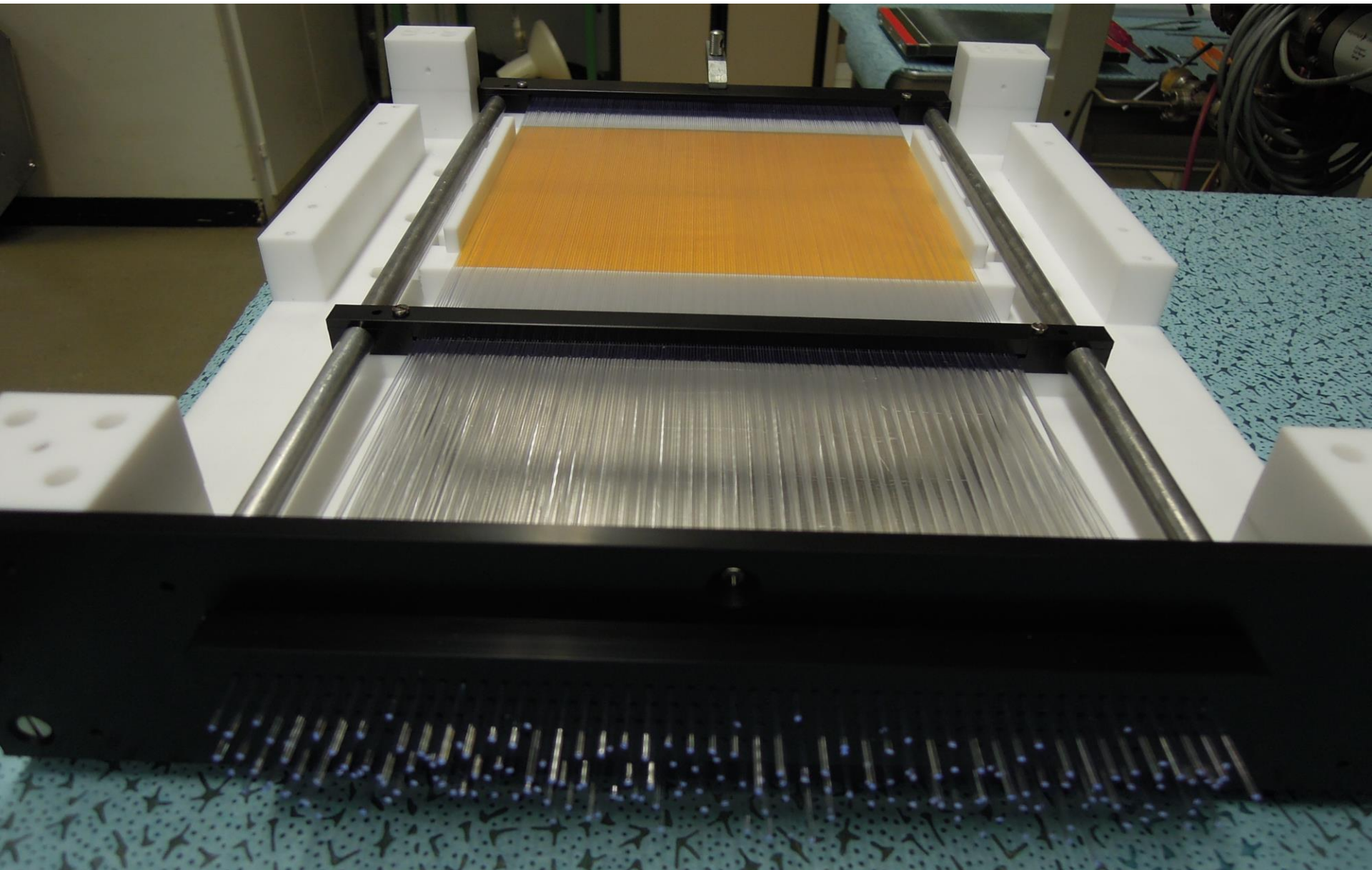
Jonathan Franchi CERN EP-DT-EF

16

To the real size detector



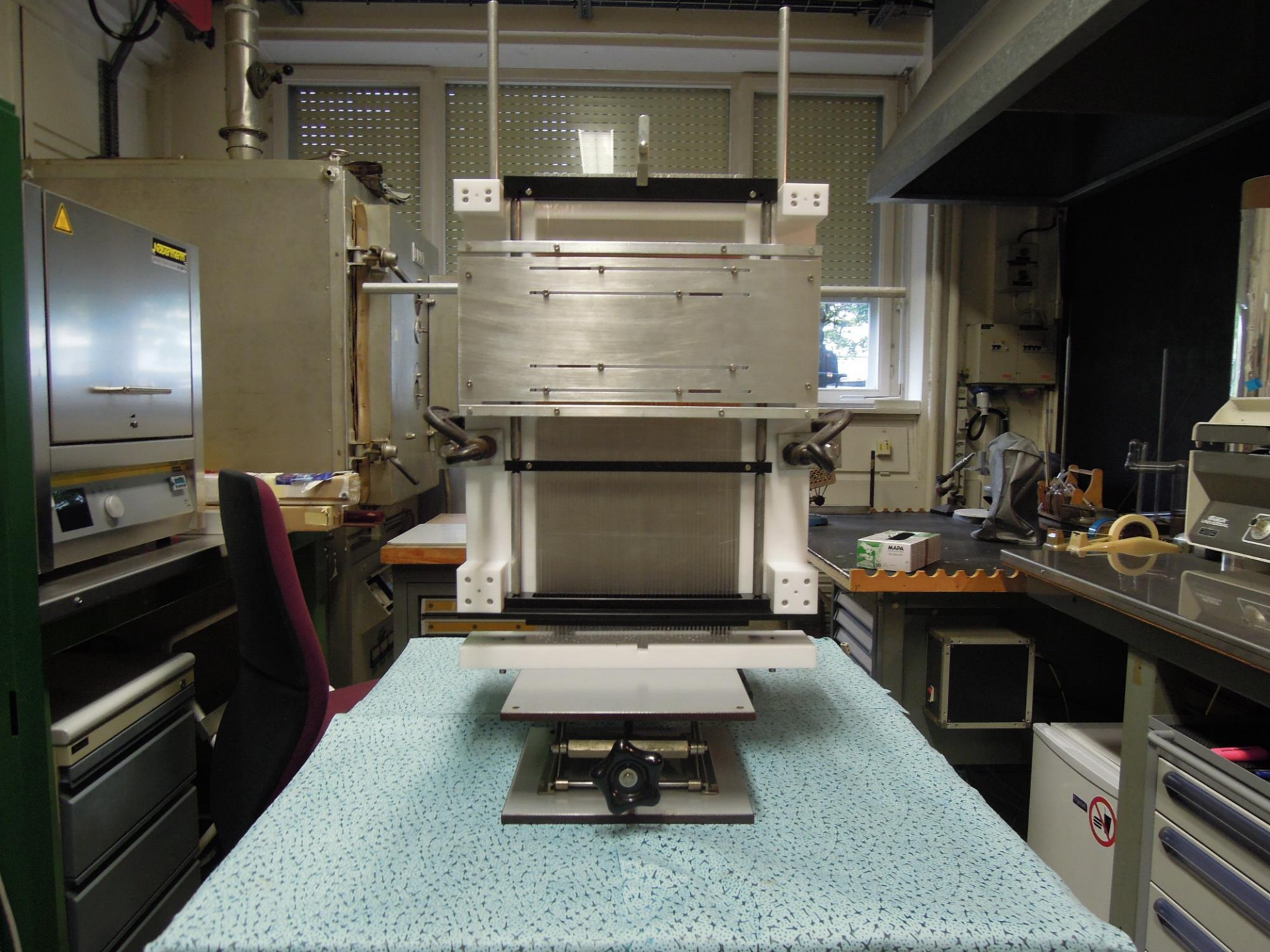
Assembly process

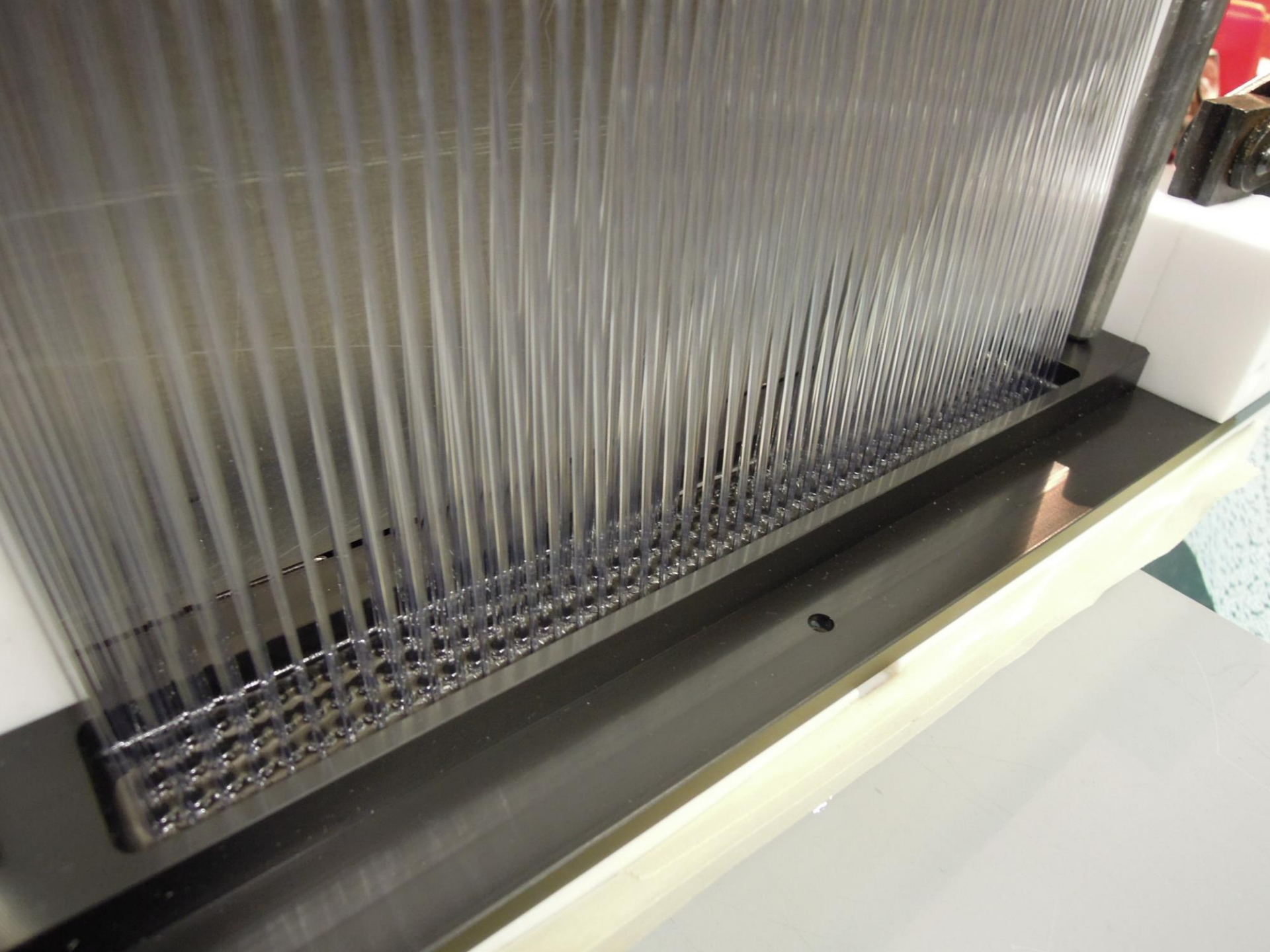




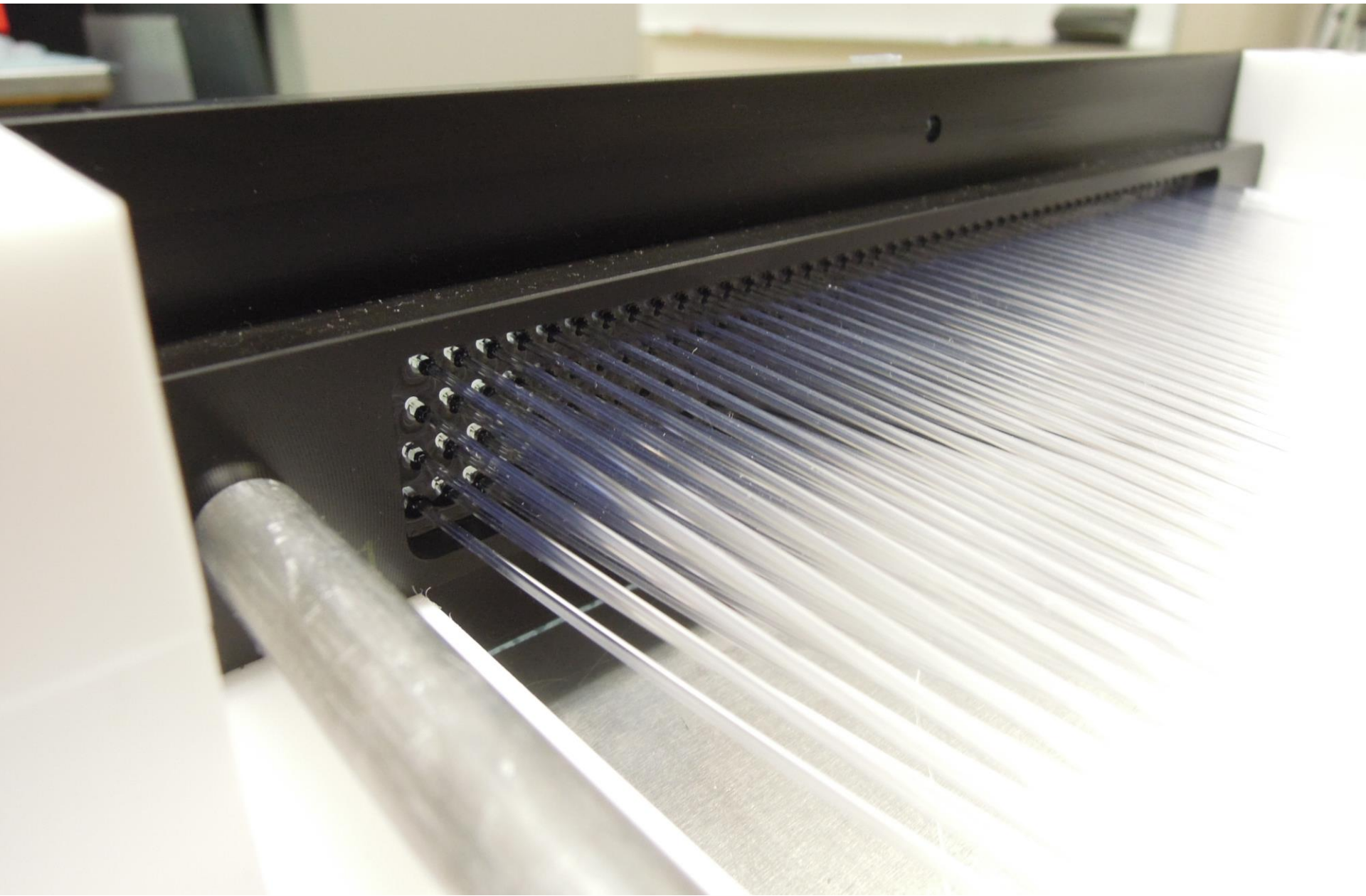
DO NOT TOUCH!
Glue is curing

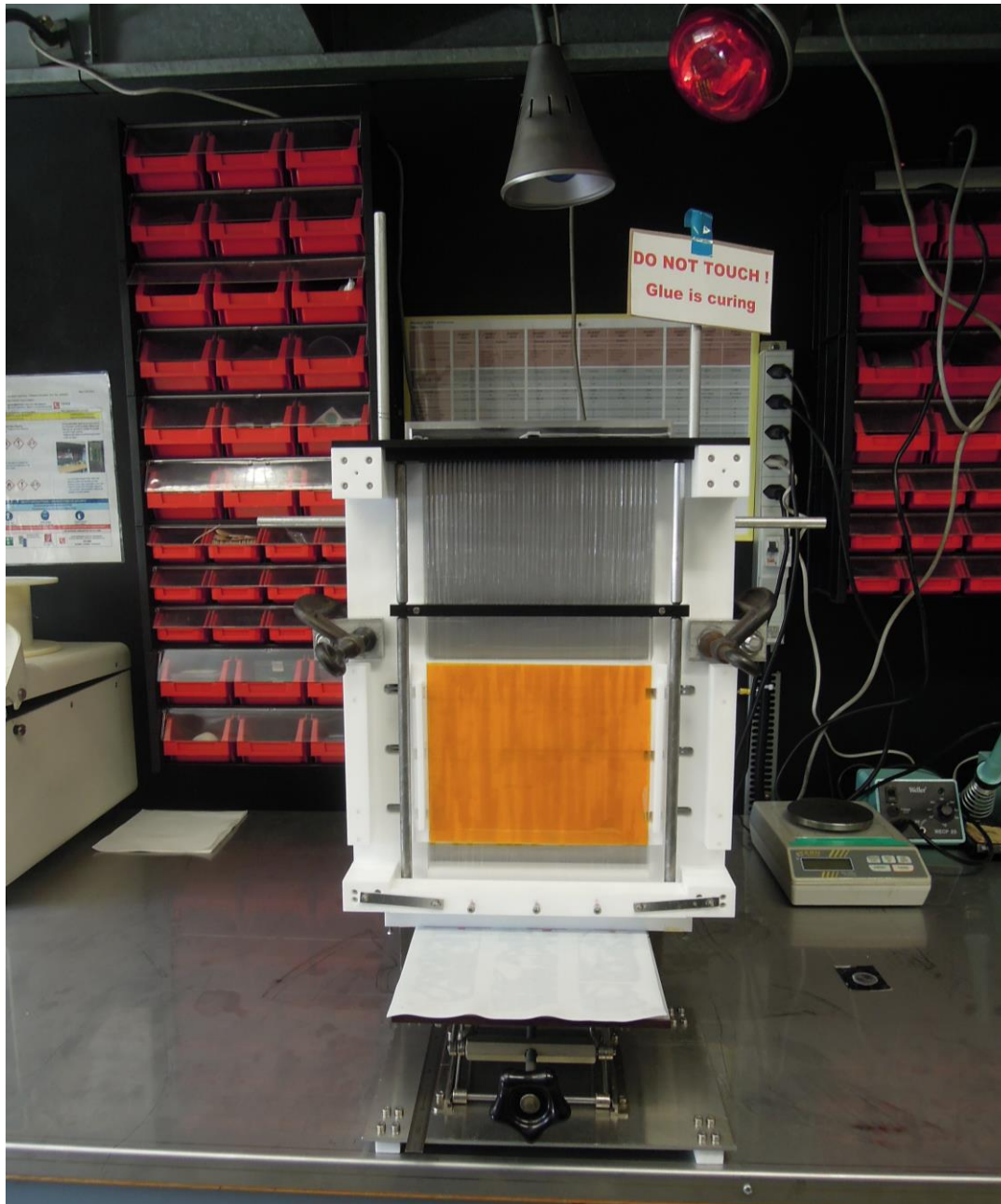


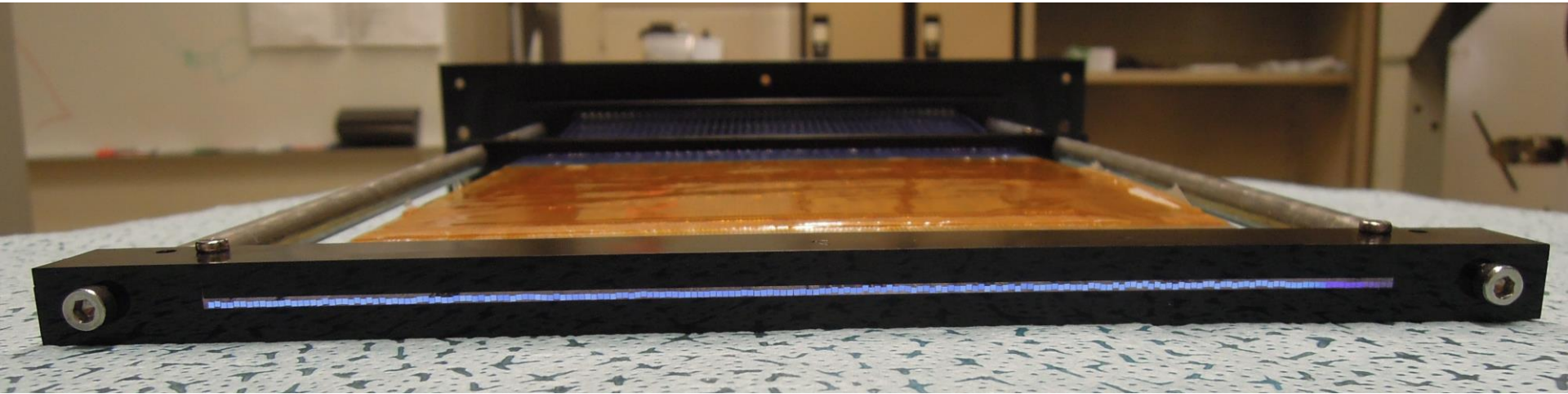












The XSCINT module is giving some problems

