



QUAD testbox

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NIKHEF

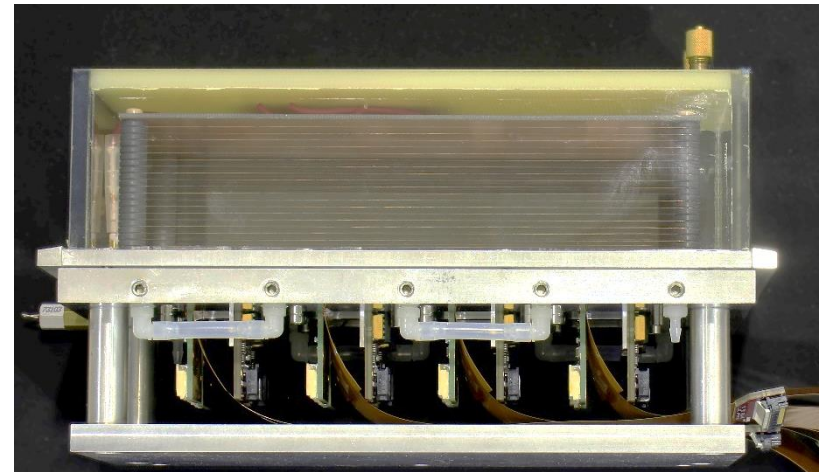
Nikhef/Bonn LepCol meeting
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Simplified overview production

QUAD	started	Mech. assy	Wire bonded	DAQ/HV test	Ready	Remarks
10	X	X	X	-	X	DEMO, not electrically working
11	X	X	X	X	X	~30 um alignment error
12	X	X	X	X	X	~30 um alignment error
13	X	X	X	X	X	
14	X	X	X	X/-	X	2 chips not operational (flex damage)
15	X	X	X	X	X	
16	X	X	X	X	X	
17	X	X	X	X	X	
18	X	X	X	-		Not working (broken clock line in flex)
19	X	X	X	X	X	
20	X	X	X	X	X	
21	X	X	X	X	X	
22	X	X	X	X		Only guard lacking
23	X	X	X	X		Only guard lacking
24	X	X	X	X		Only guard lacking

Status testbox

- **Done**
- All 8 QUADs in the testbox can have HV (grid voltage)
- Field cage finished and tested
 - Including the external HV connections
- Field shaping wires above chip to chip joint added
 - Additional HV channel
- Measure coordinates of all chips
 - Make LabVIEW program
- Assemble parts for laser setup
 - Add moisture sensor in gas hood
- Check gas tightness, O₂ and water diffusion

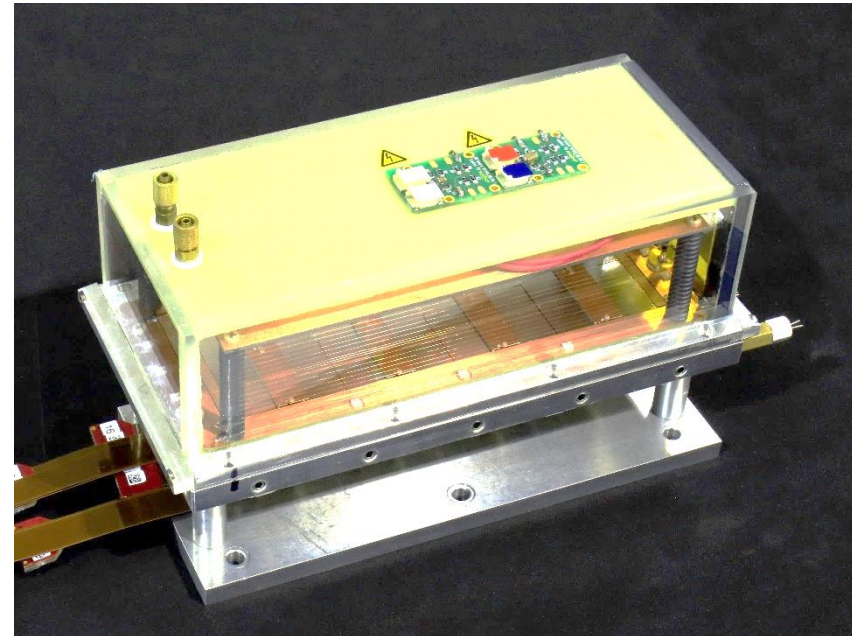


- **To be done**
 - Make all HV grid and central guard connections (2 x 8)
 - Add 5th HV channel to LabVIEW control program
- Install liquid cooling system
- Temporary DAQ with one or two SPIDR boards (lacking concentrator firmware)
- Repair flex quad17 (accident)
- **Can be brought into operation this month**

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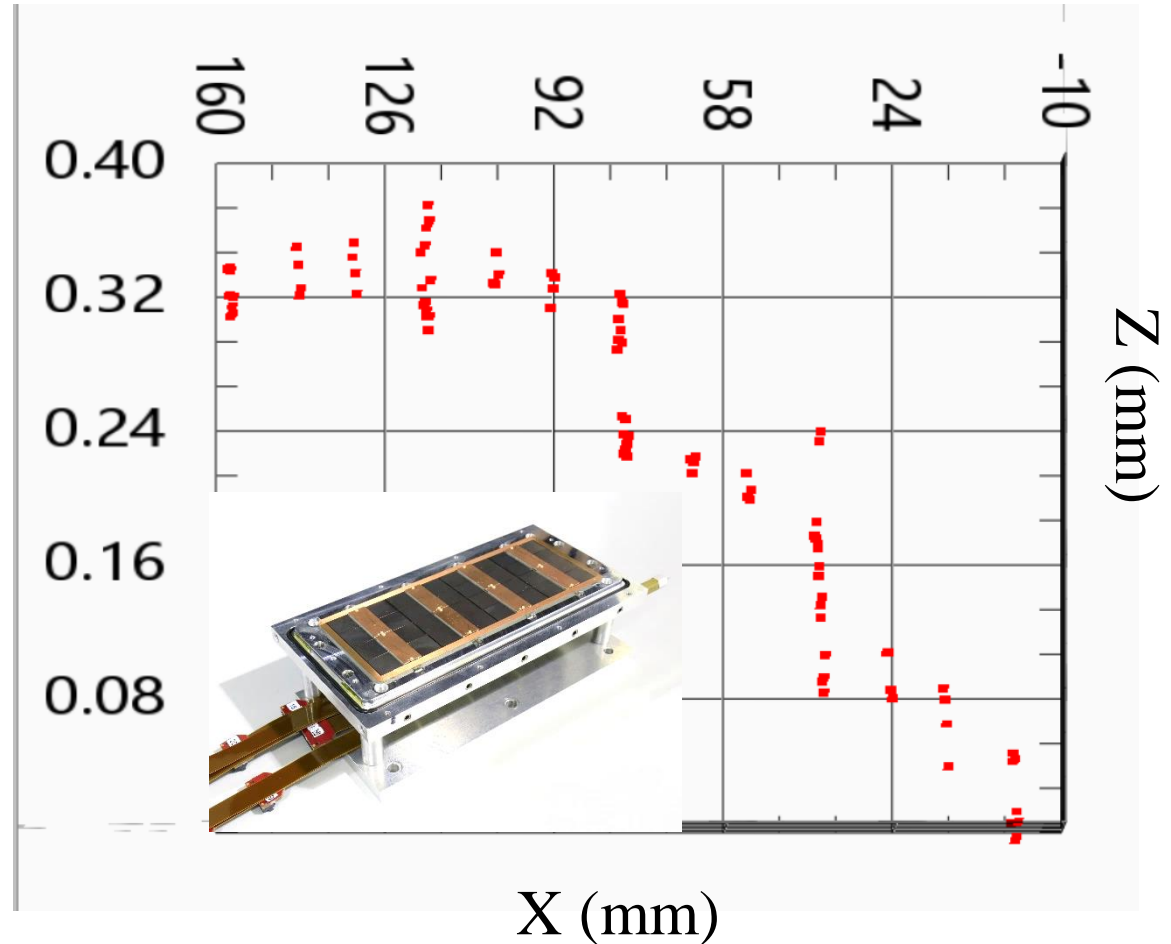
Testbox under gas

- All 8 quads installed
- No leaks (< 0.1 ml/min)
 - Initial leak cured
- O₂ diffusion very small
 - We can get $C_{O_2} < 30$ ppM
 - Uncertainty of O₂ meter reading
 - Old testbox ≥ 800 ppM
- Moisture level
 - 700 ppM, slowly going down
 - Outgassing of materials
 - Glass fibre epoxy, araldite
 - Old testbox 3000 – 4000 ppM



Metrology

- XYZ measurement in two steps across the full length and width
- Base plate very bad flatness
 - More than 300 μm
- Corresponds with variations in thickness of the plate
 - \Rightarrow underside may be well flat
- Some torsion in Y
 - Two chips tilted
 - 100 and 150 μm

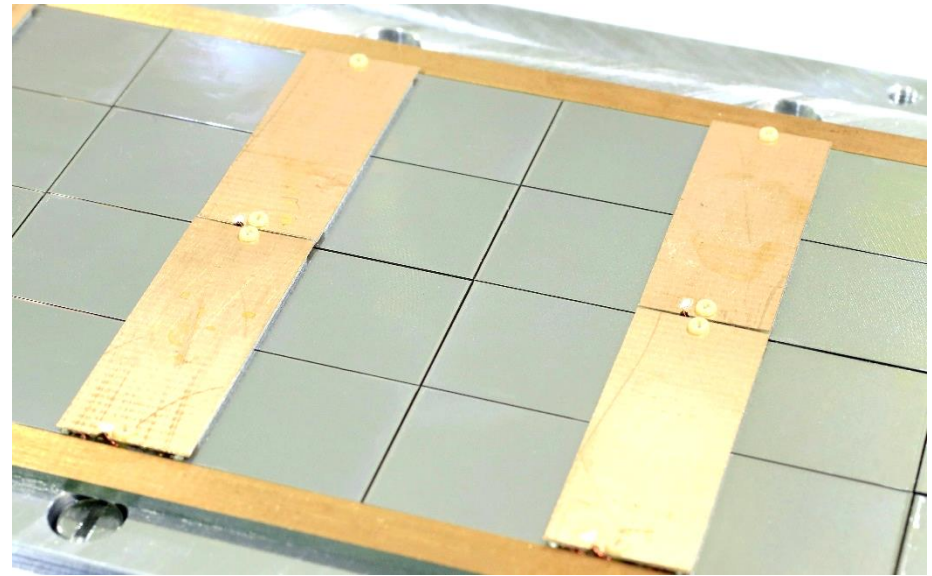


How to improve

- To be done:

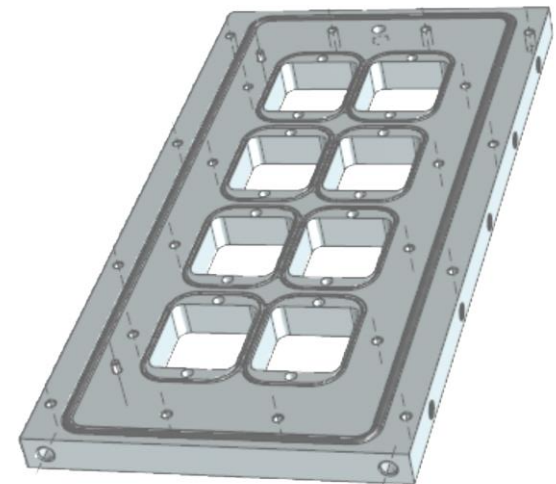
1. Tilted chips

- Take all quads off
- Examine all edges for extruding chips
- Reinstall quads such that the extruding edges are on the outer side
 - We have more clearance at the boundary quad – guard



2. Machine top surface of base plate (Oscar)

- Requires ~ 1 week
- Involves some risks
 - Grid damage
 - Damage thin HV wires



Spare

Measuring chip position

- Use the alignment microscope with LabVIEW controlled XY stage
 - Stage range 100 x 100 mm => we have to do it in two steps with a number of points in overlap
- Use LabVIEW program to move to all measuring points
 - XY by manual fine adjustment, automatic coordinate recording
 - Z by autofocusing of microscope => **coordinate recording by hand!**
- Also measurement of guard height
- In total $96 + 8$ (overlap) + 12 (guard) = 116 points to measure
- One point may take ~ 1 min

