



QUAD development/ & testbox

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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

Production status

- 3 last QUADs
 - DAQ test OK
 - HV test OK
 - Grid current below 1 nA

■ Only the guards are missing

■ Also waiting for concentrator programming



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

■ To be done

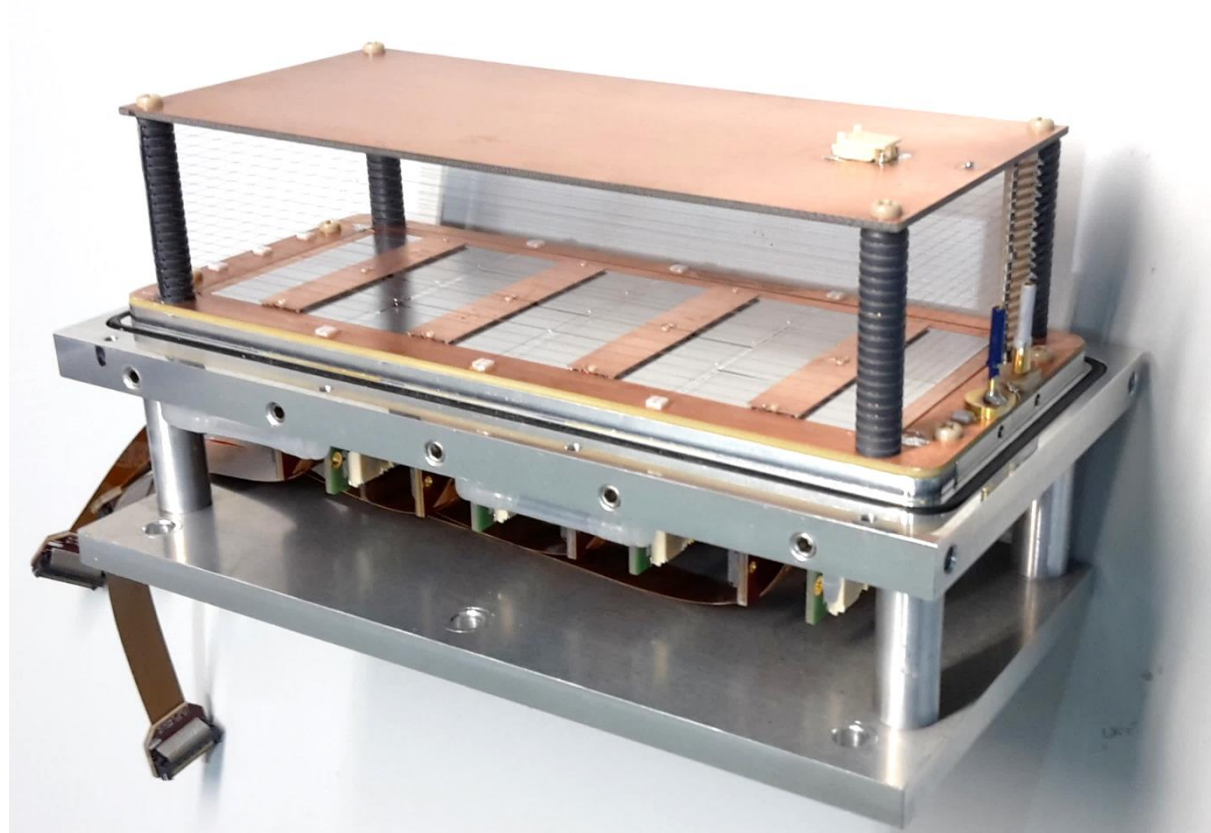
- Measure coordinates of all chips
 - Make LabVIEW program
- Assemble parts for laser setup
 - Make all HV grid and central guard connections (2 x 8)
 - Add 5th HV channel to LabVIEW control program
 - Add moisture sensor in gas hood
- Check gas tightness, O₂ and water diffusion
- Install liquid cooling system
- Temporary DAQ with one or two SPIDR boards

■ Can be brought into operation this month

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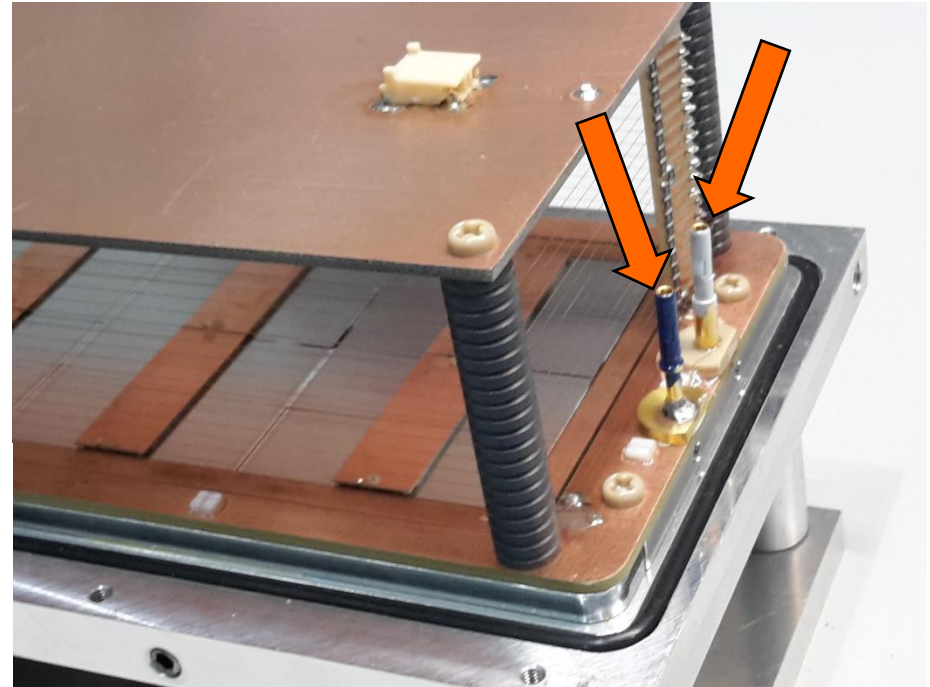
Field cage

- Inter-chip field wires added
 - 1.10 – 1.18 mm above grids
- Central guards 0.8 – 0.9 mm high
 - => no contact between wires and guards
- Additional interchip PS added

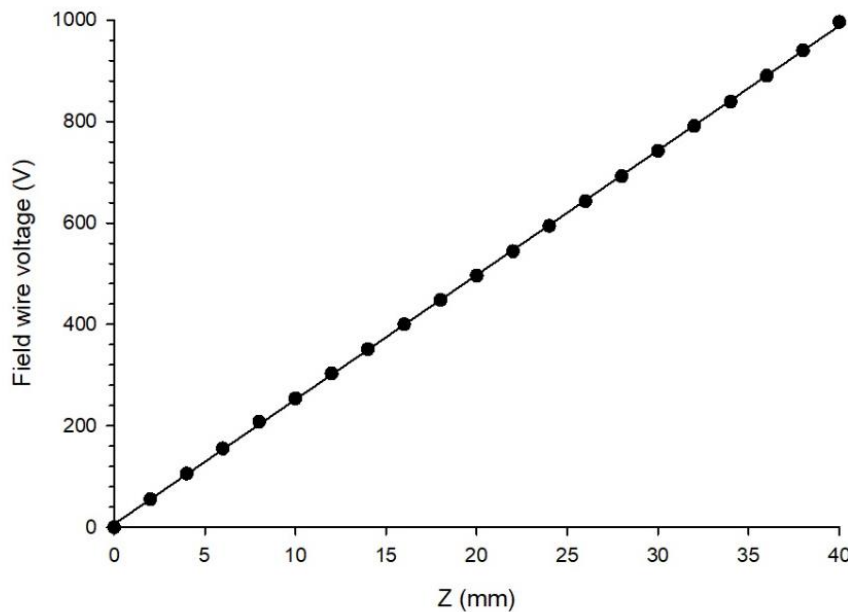


Field cage

- 3 HV connections
 - Cathode plane
 - Field cage guard
 - Inter-chip wires
- Potentials on voltage divider checked

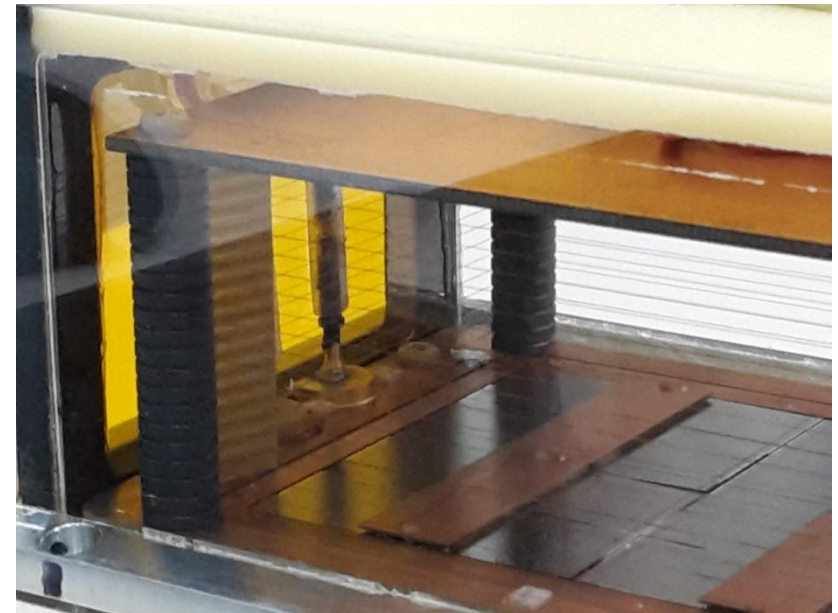
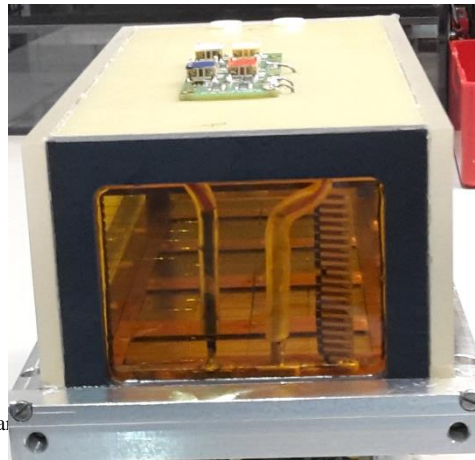
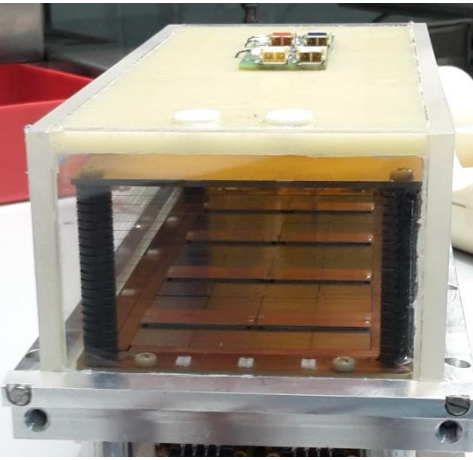
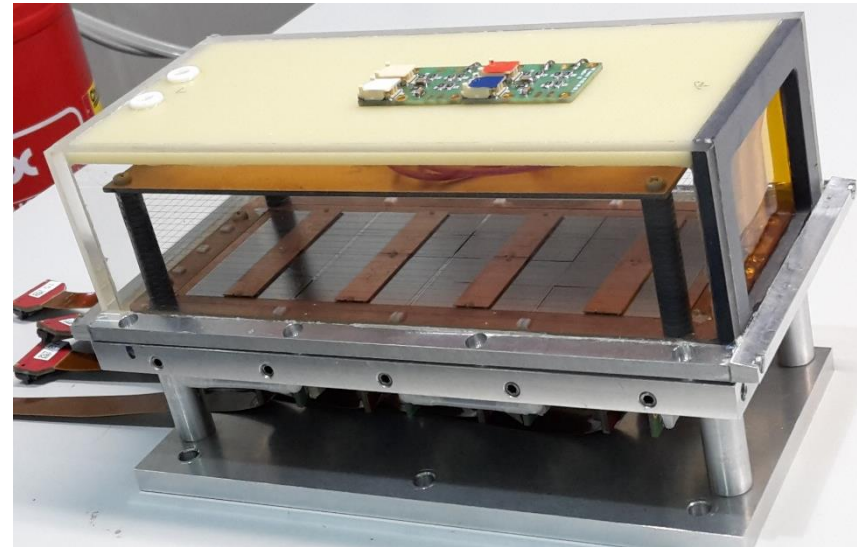


Field wire voltage vs position to field cage frame (Z)



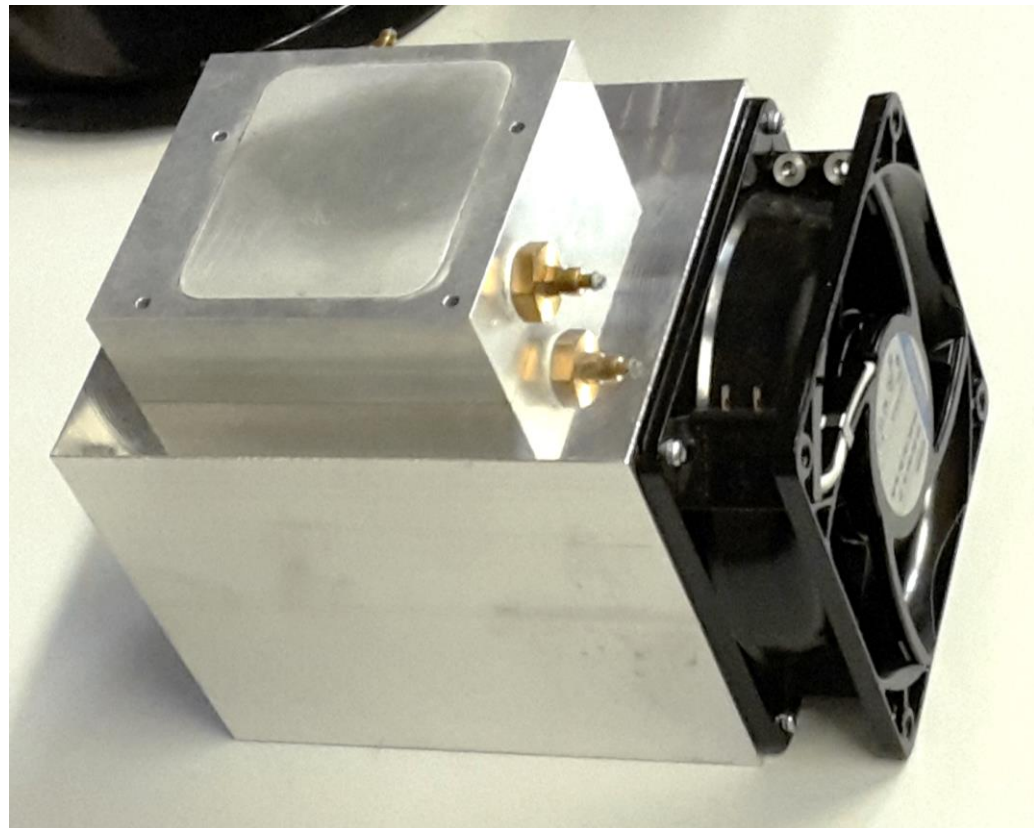
Testbox

- At short sides one 5 mm glass plate (laser) and one foil
- => for the testbeam we may need another hood
 - Unless we place the telescope very close to the testbox



Cooling

- For the testbox we have to cool 60 – 80W
- => the present 10 l liquid container will get too hot in due time
- Cooling block will be installed (0.1 C/W)



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HV test of QUADs in testbox

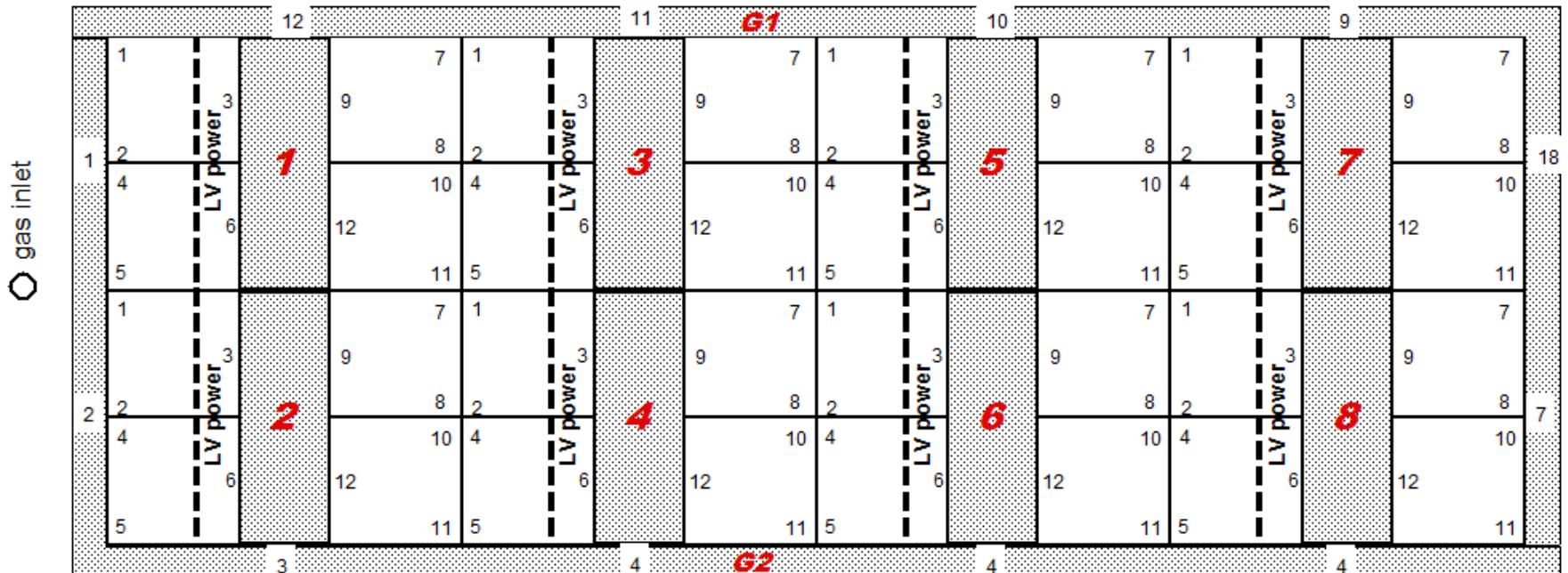
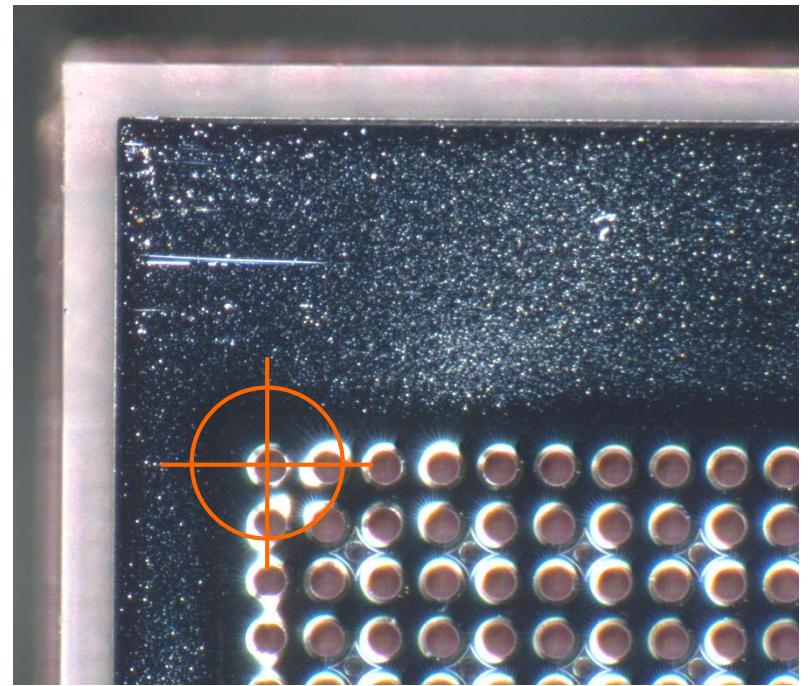
- Initially one short (QUAD 17)
- QUAD taken out => no short
 - Reinstalled => still OK

- Test at 300V in air
- 3 QUADs with high grid current
 - 120, 150 and 350 nA
 - Temperature and moisture sensitive
- Other four had 25 nA or less

- Currents of all QUADs reduced by 40 – 50% the next day
 - => caused by Araldite to passivate the HV connection
 - Will go down to ~ zero in due time (progressed curing)

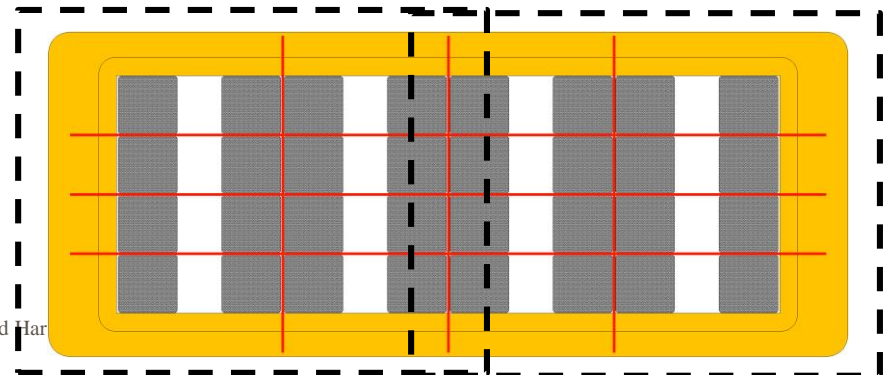
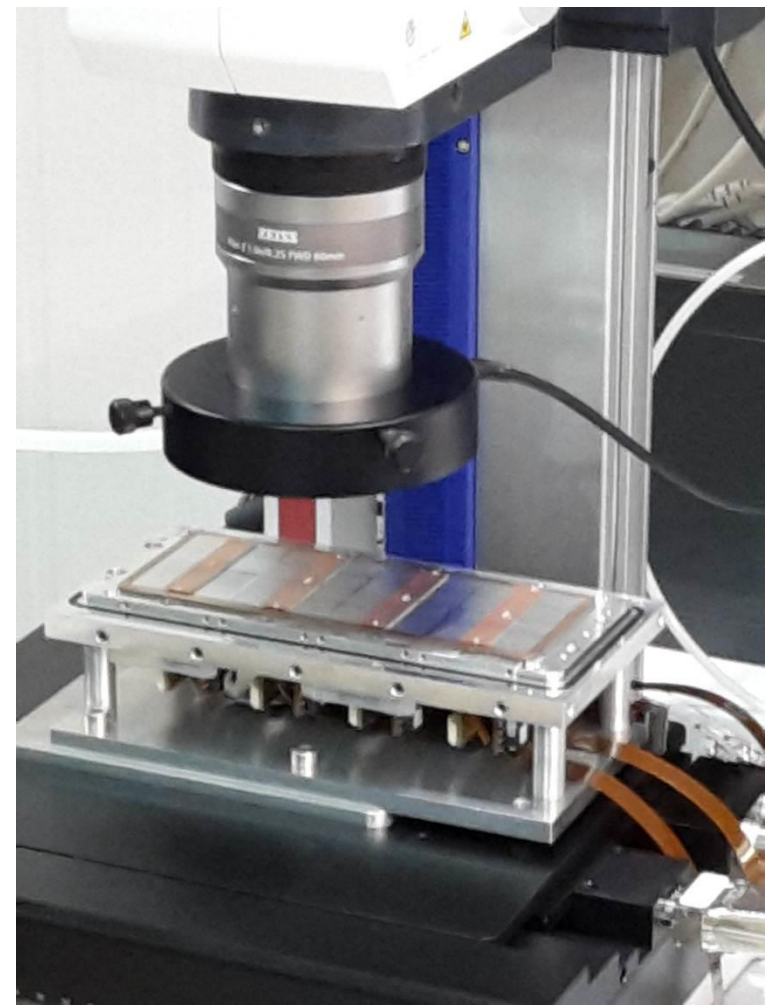
Chip position dataset

- For the completely assembled testbox we need a map with the X/Y/Z/ φ coordinates of all 32 chips
 - Characterize each chip by measuring 3 holes on the grid
- LabVIEW program in progress



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



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