QUAD development

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Nikhef/Bonn LepCol meeting
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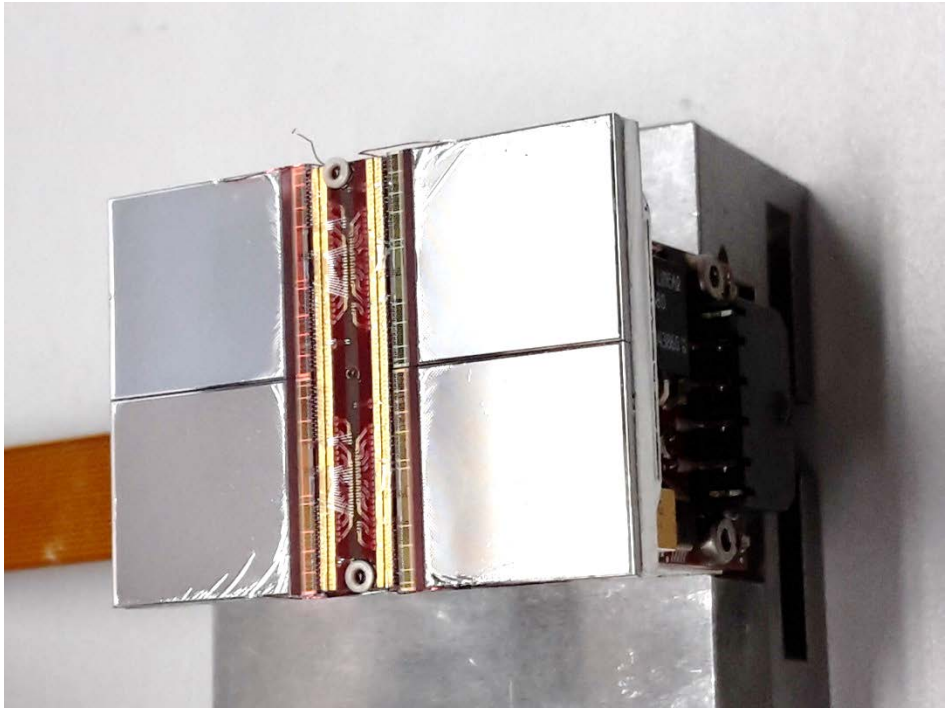
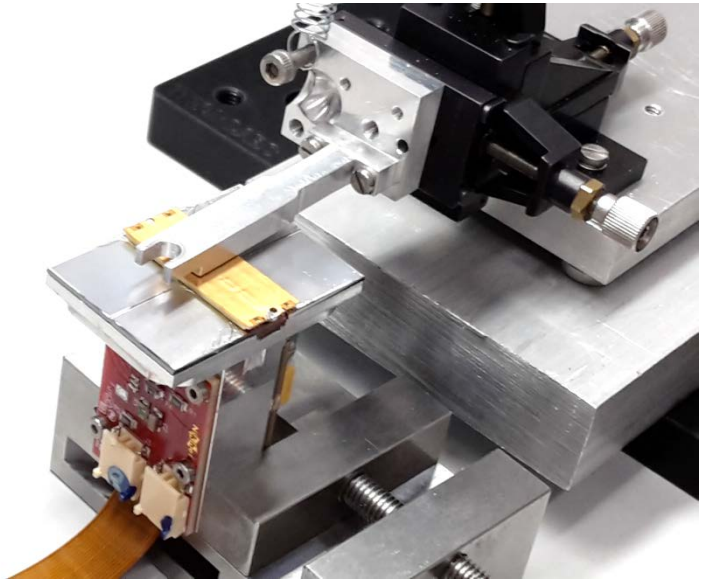
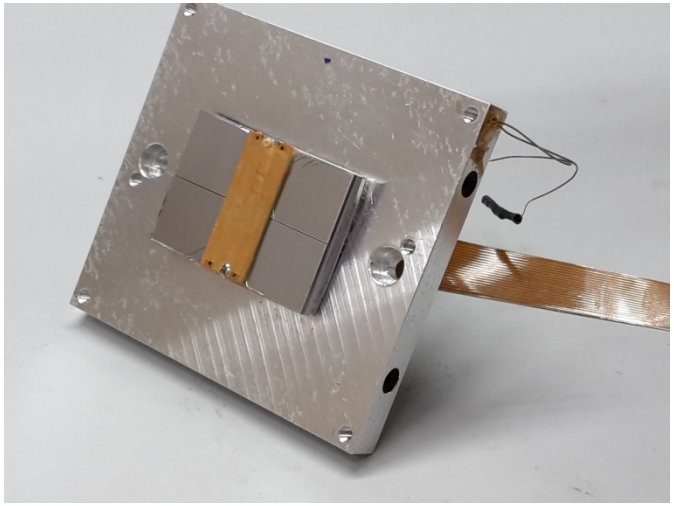
Electrical QUAD 2 assembled and installed

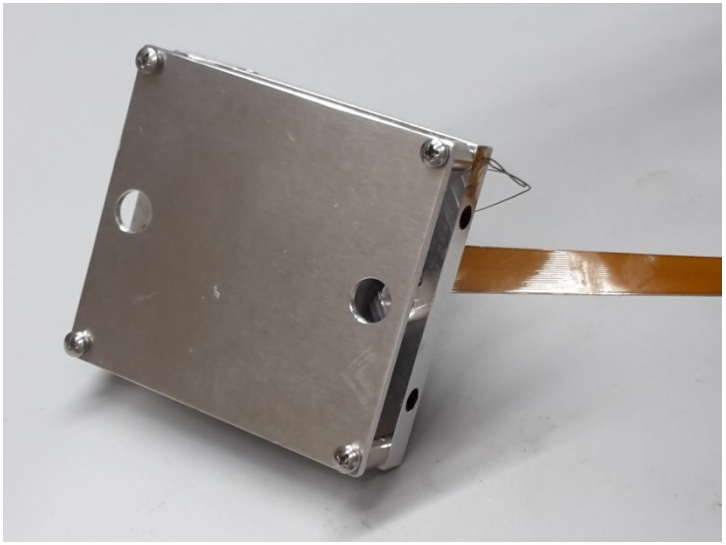
- 2 Class A chips, wrinkled grid
- HV grid contact to very narrow dyke very problematic
  - Delaminated at the class A chips
  - Contact by Traduct silver glue
  - Passivated by Araldite
    - Mechanical strength
    - Insulation
- Mounting guard
  - Positioning with XYZ stage
  - 2nd screw (M1.2) did not fit
    - Error in hole to hole distance?
  - At both ends secured with minor amount of Araldite
  - Problem expected to be solved for new generation wirebond boards and guards
- Jean Paul is making a new guard from coppered glass fibre epoxy

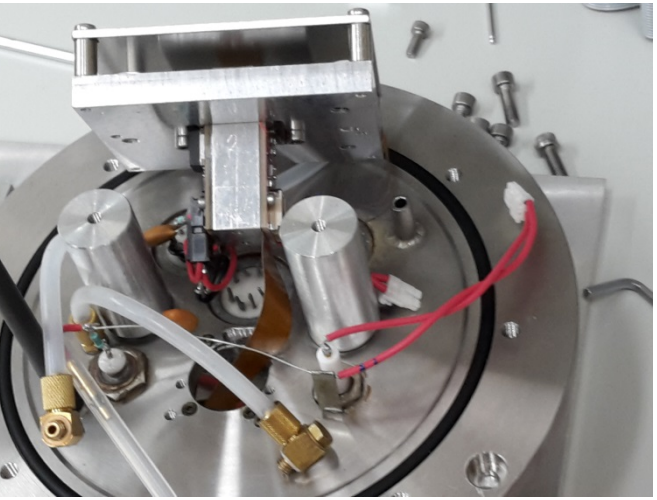


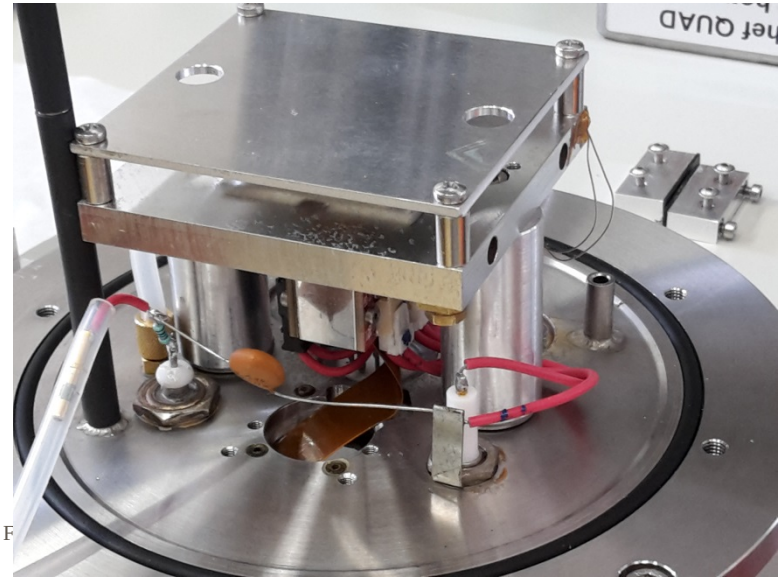


Assembly in test box

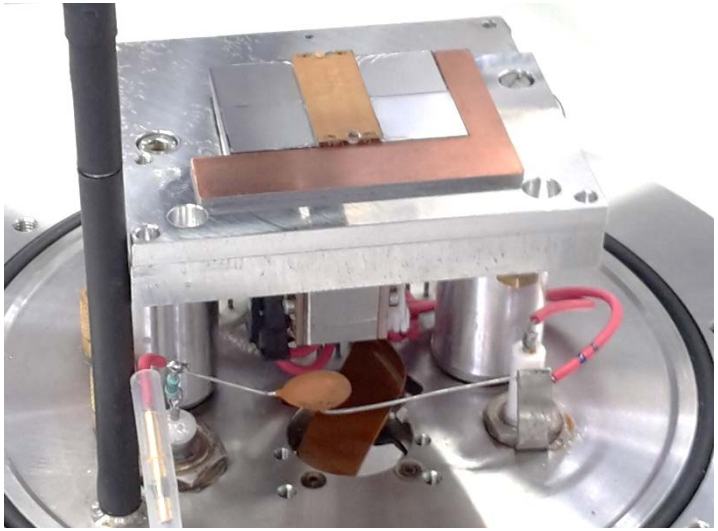


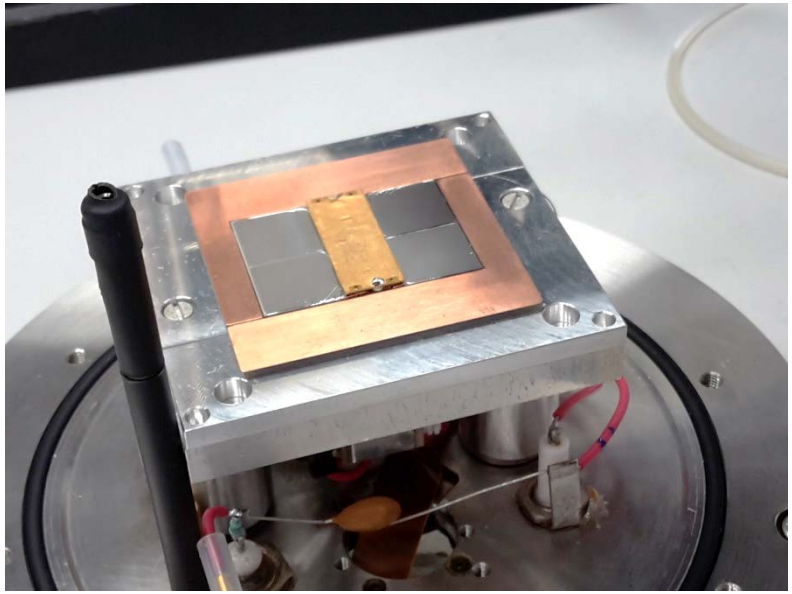


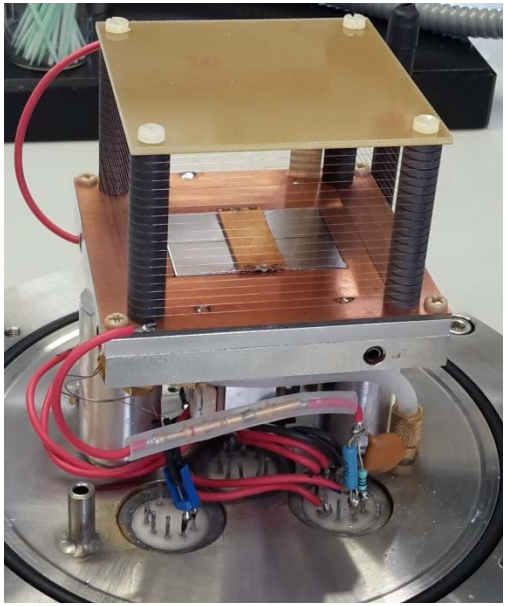


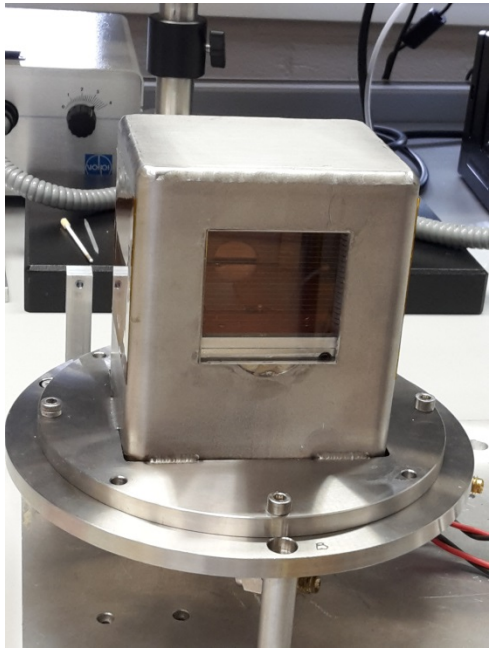


Assembly in test box cntd



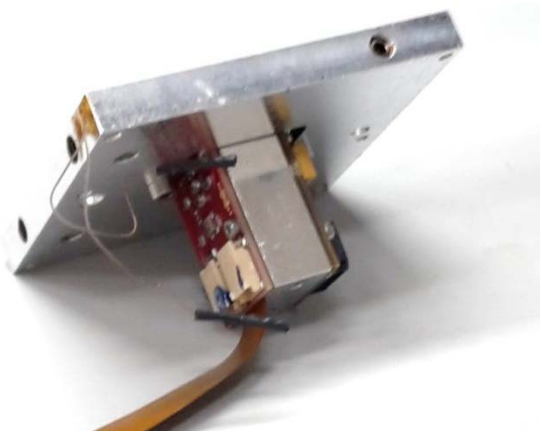






First HV tests

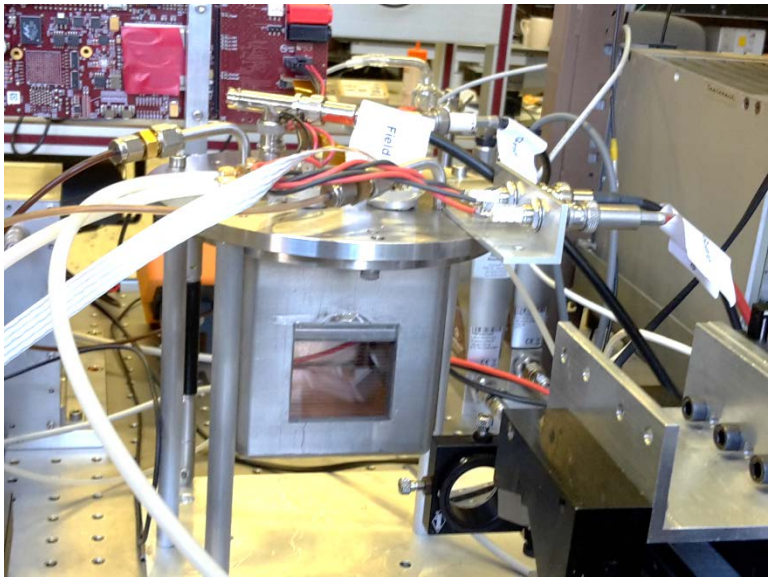
- Done with ISEG HV supply and HV probe (1 GΩ impedance)
- Grids connected by HV board
  - 100 MΩ and 50 MΩ
- Test in air
- All grids had correct HV
- Initially high current (600 nA @ 50V
  - Decreasing to 170 nA @ 200 V

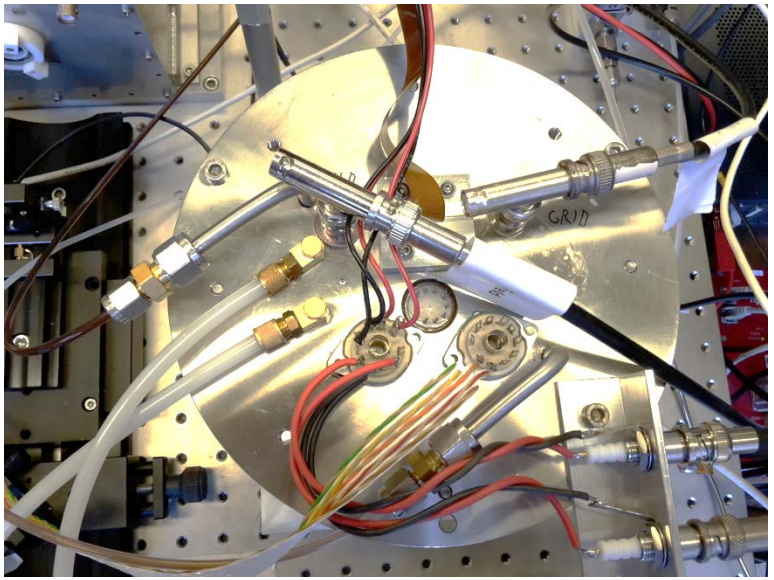


- Under gas trip at 200 V
  - After 10 h at 100 V also trip
- After weekend ramping up to 200 V
  - 1st trip after 1 min
  - 2nd trip after 10 min
  - 3rd trip after 40 min

QUAD 2 tested in gas

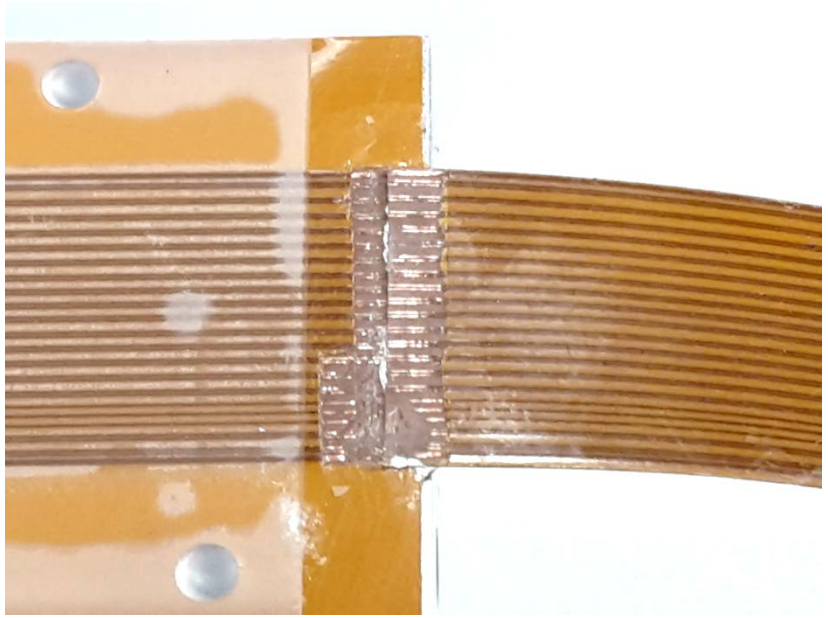
- Flushing with T2K
  - => 2.3% O_2 at 3 ml/min on long term (box has 700 ml content)
  - => 1.1% O_2 by replacing the rubber of the flex feedthrough
- Initially HV problems
  - Test up to 200 V => trip
  - Long term curing at 100 V => trip after 8 h
  - Next day ramp up to 200 V
    - Trip after 1 min
    - Trip after 10 min
    - Trip after 40 min
    - No trip until the next day
  - Can be ramped up now to 300 V
- Also too high grid current
  - Starting at 600 nA @ 50 V
  - Decreasing to about 100 nA at 200 V
- But falling down very rapidly after increasing the gas flow (2 => 16.7 ml/min)
  - => probably moisture effect on the Araldite





Test QUAD 2 cntd

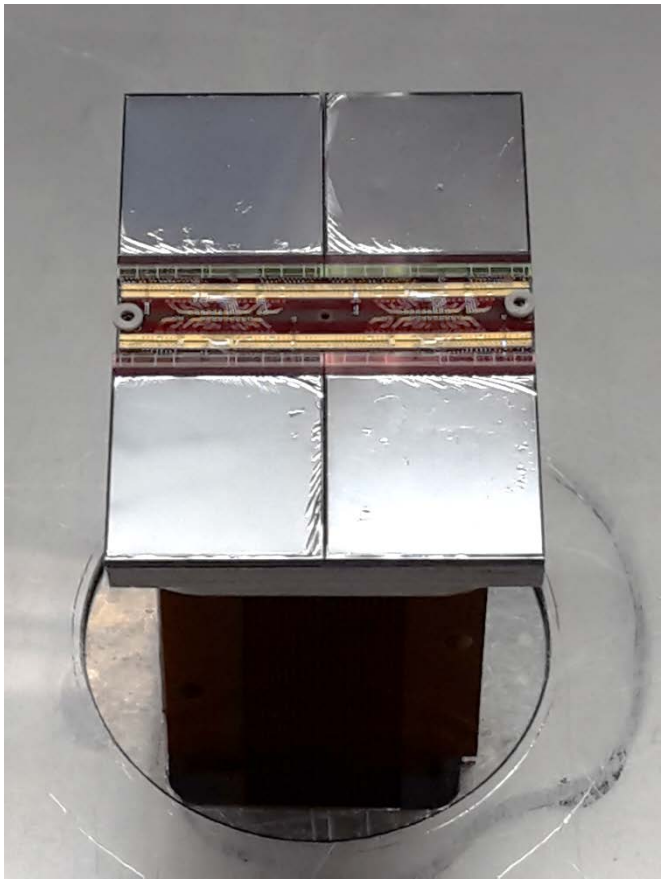
- At 300 V still no induced current visible with ^{90}Sr source
  - Too high O_2 level?
- Both too high O_2 level and high moisture level possibly caused by silicon rubber cooling tubes
- => replaced by Delrin tubing
  - Risky: much more rigid
- **DISASTER**
  - Flex broke while replacing the cooling tubing
  - Attempt to repair (conductive glue + wire bonding)
  - Good result far from guaranteed
- Reinstalled in test box
  - Guard cage sparking at 300 V??
  - **Waiting for DAQ test**



Starting assembly QUAD 3

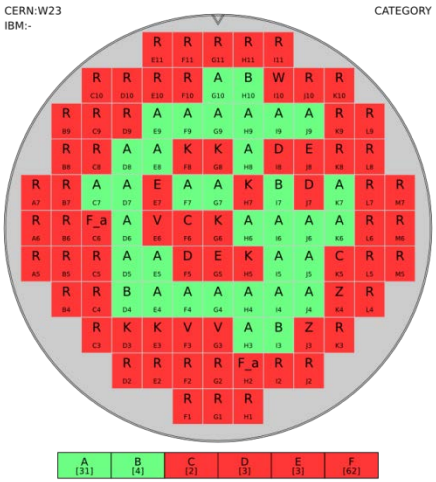
- √ Wirebond PCB machined on size
- √ Stump, coca, wirebond PCB + flex glued together
- √ Glue traces at coca removed
- √ Guard nuts glued
- √ Chips assembled
- √ Wire bonded
- **DAQ to be tested**
  - Bas is busy with it
    - Possible problems DAQ software (I_{bias} of one chip cannot be set)
- HV to grid connections made
  - 4 days needed (3 glue steps)
- HV/connectivity test in air (200 V)
- Installation in test box

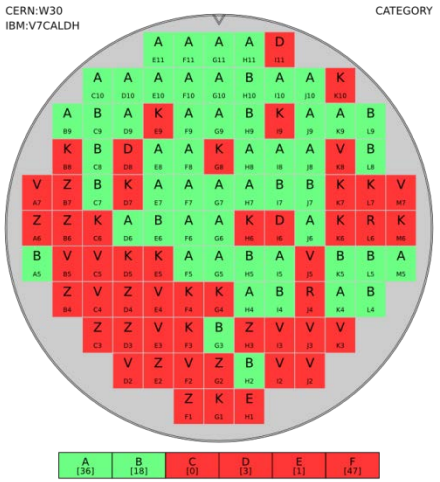
- Still to be done
  - **DAQ test at the laser setup**
  - Configured SPIDR board from Bas available



Wafers

- Two low yield wafers (W23 and W30 finally shipped from CERN to Nikhef
  - Some 40 days delay
  - Received by Yevgen
  - Starting photolithography in January
- 2 high yield wafer on hold at Nikhef





Summary

- **Presently QUAD development is on hold due to the lack of electrical performance testing**