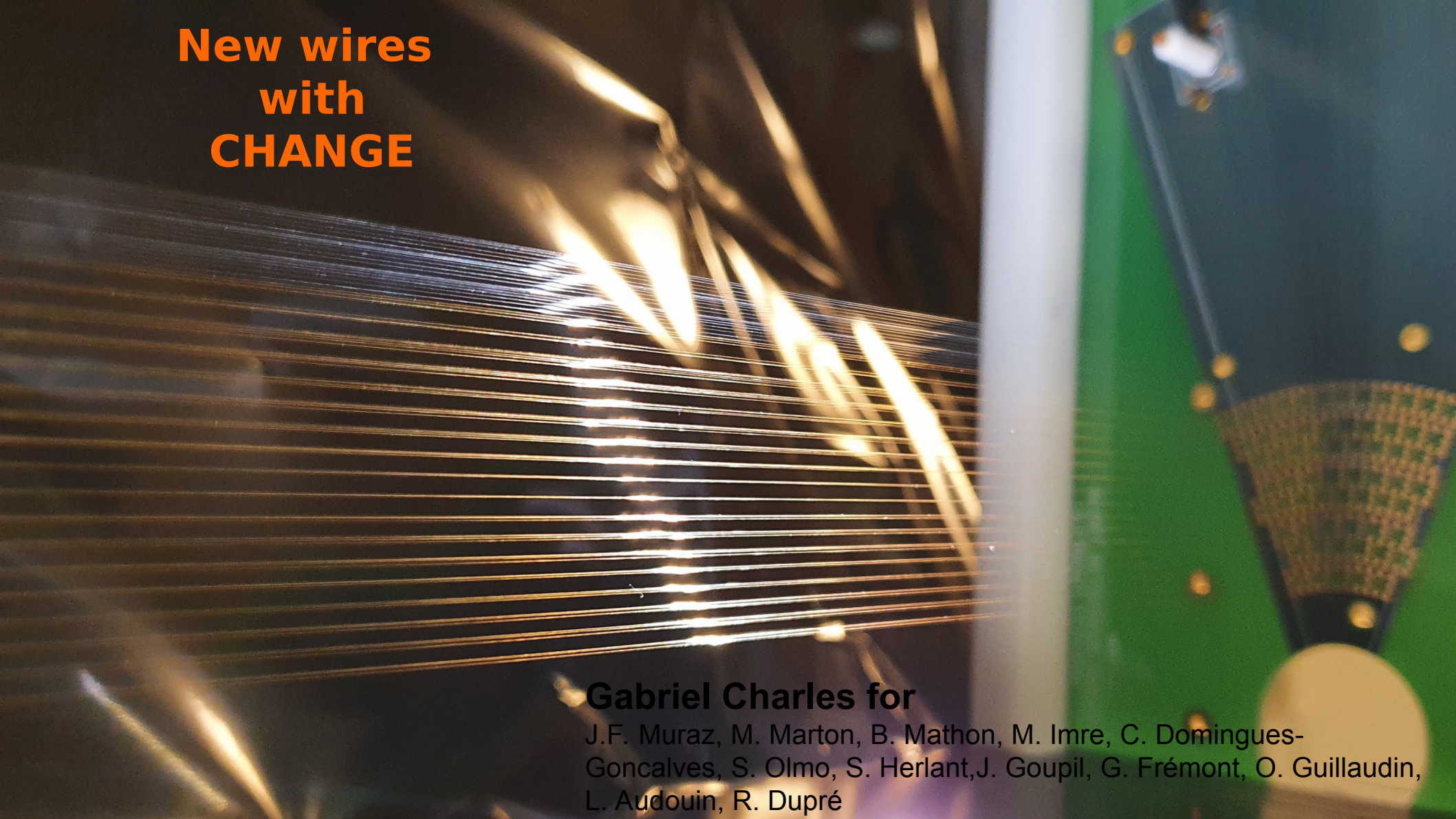

New wires with CHANGE

Gabriel Charles for

J.F. Muraz, M. Marton, B. Mathon, M. Imre, C. Domingues-Goncalves, S. Olmo, S. Herlant,J. Goupil, G. Frémont, O. Guillaudin, L. Audouin, R. Dupré

Drift chambers: current state of the art

- Can cover large areas with low material budget
- Uses gold plated tungstate wires (a few with aluminium wires)
- Wire diameter around 50 µm
- A few chambers with aluminium field wires
- 2 mm between each wires for most complexe chambers
- Dimensions from cm^2 to m^2

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With a lighter wire, the total material budget of the chamber would be reduced and the constraints on the mechanics lower

CHANGE: aims

New GEneration drift CHAmber

1) Make the use of carbon based wires standard

Within IN2P3

2) Develop reliable method to attach the carbon wires

3) Develop adapted weaving machines

4) Study the contribution of the electric resistivity of the carbon based wires to the property of the chambers

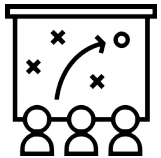
5) Ageing study of the carbon wires

6) Keep the knowledge of the teams

7) Keep the weaving machine working

CHANGE: aims

New GEneration drift CHAmber



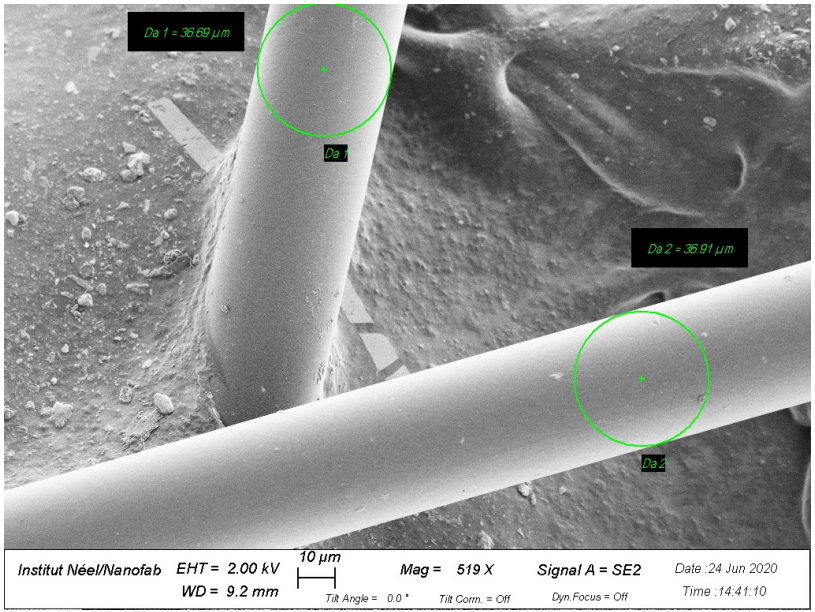
Chosen strategy:

- Test 2 types of carbon based wire
- Type 2 is available in different diameter (30, 40 et 50 µm)
- Compare with gold plated tungstate wires
- Modernise weaving machines
- Gather knowledge and experts
- Build one simple detector to tests all the wires

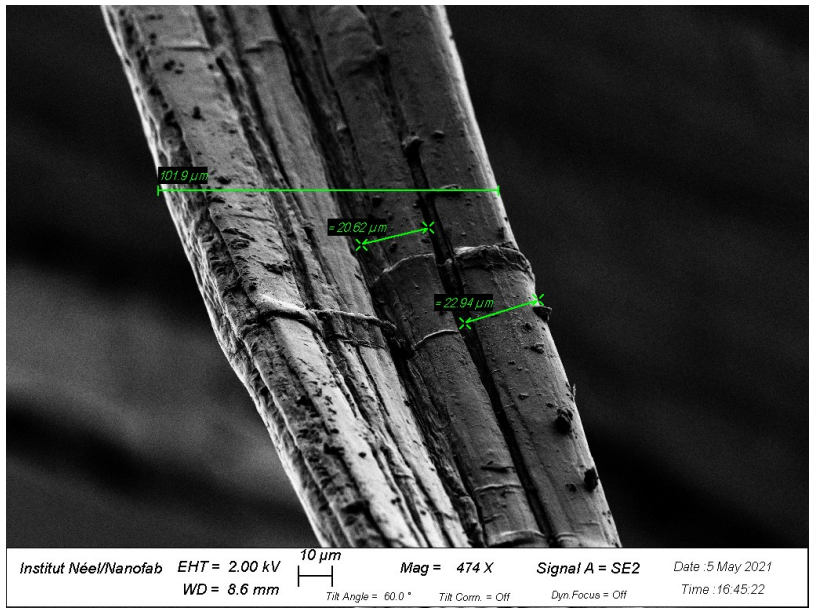
1) Make the use of carbon based wires standard
2) Develop reliable method to attach the carbon wires
3) Develop adapted weaving machines
4) Adapte readout boards, if necessary
5) Study the contribution of the electric resistivity
6) Ageing study of the carbon wires
7) Keep the knowledge of the teams
8) Keep the weaving machine working

2021-2024: ~40 k€ from IN2P3

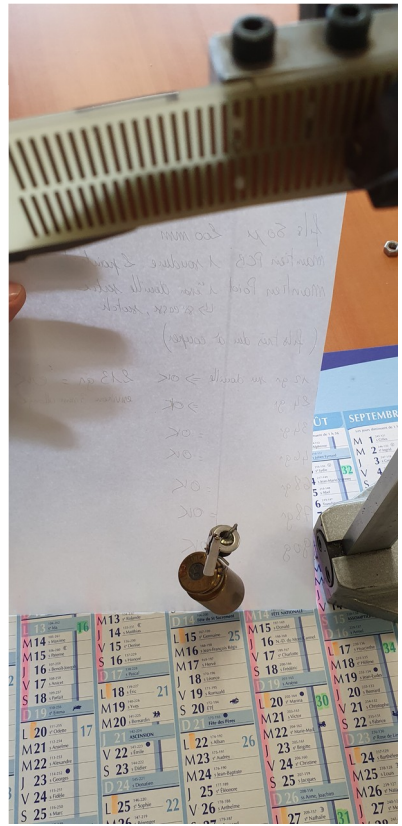
New wires: quality inspection of carbon wires



MEB view of type 1 C wire

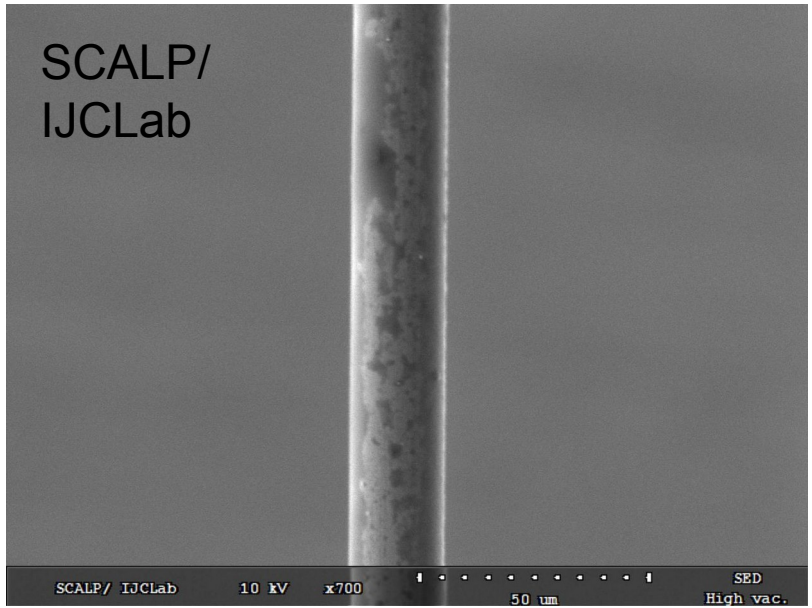


MEB view of type 2 C wire

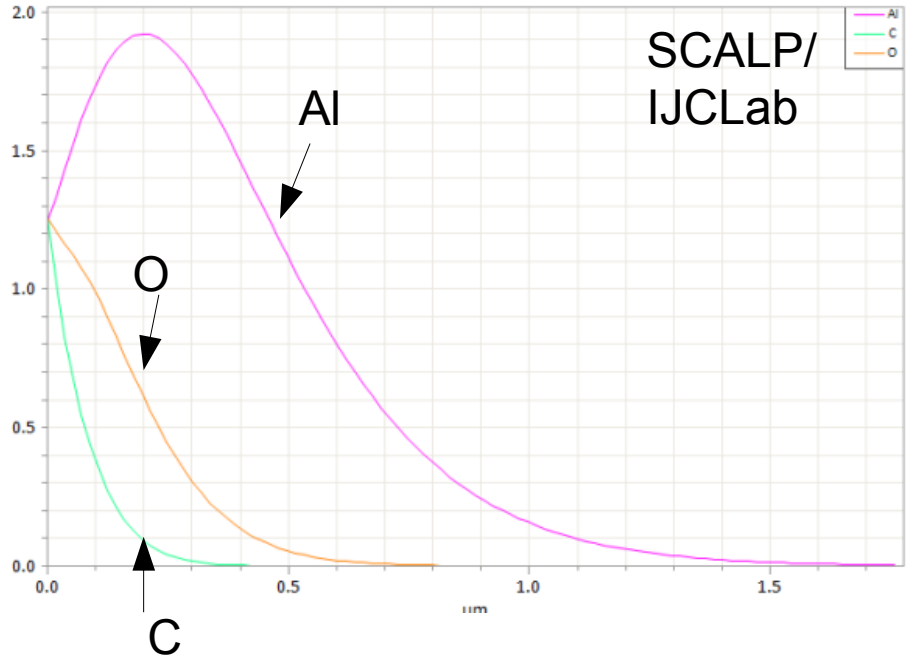


150 g for type 2, 50 µm
11,5 g for type 1, 36 µm

New wires: quality inspection of AlMg5 wires

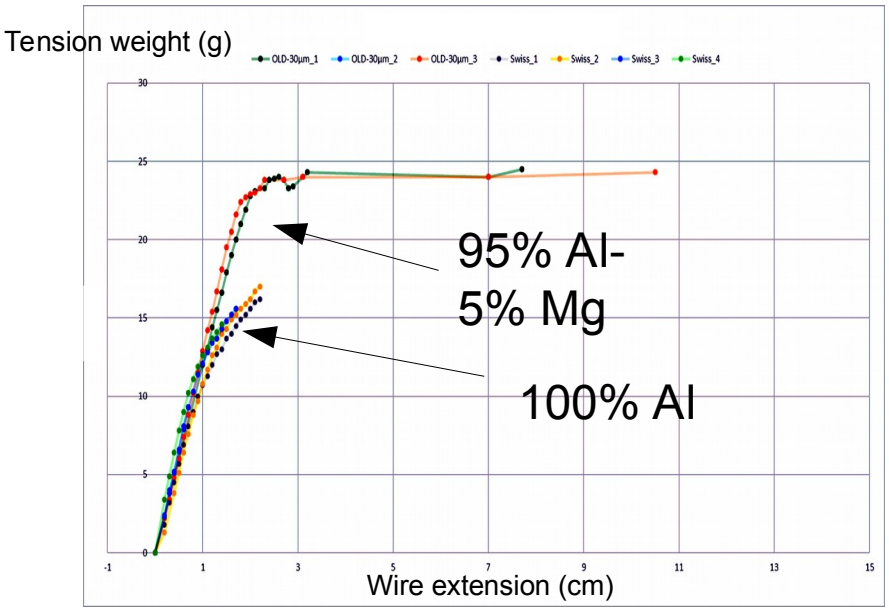


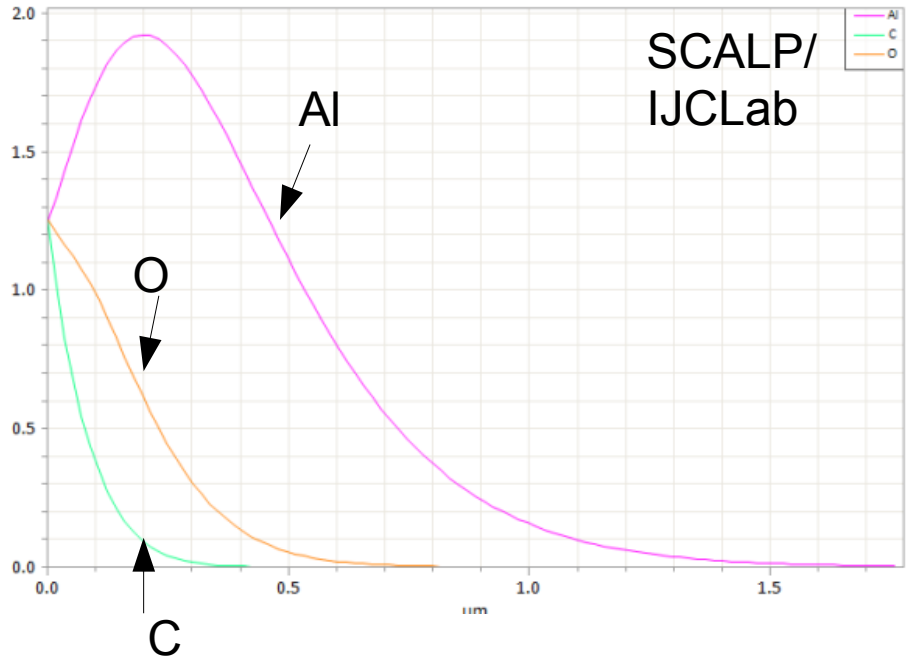
Very regular wire



But no Mg5

New wires: quality inspection of AlMg5 wires





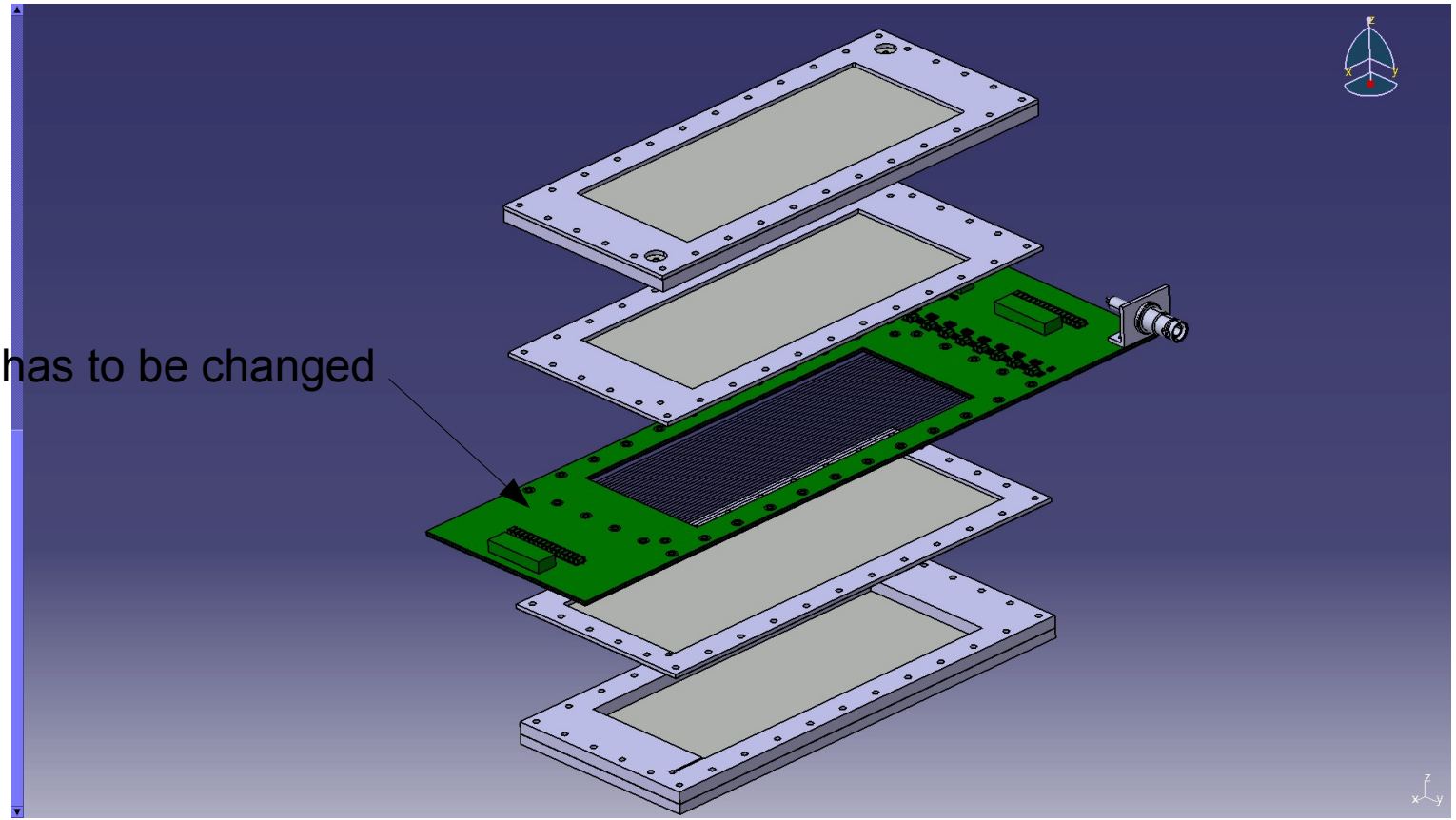
Tools to chemically and mechanically study the wires are available

But no Mg5

Mechanics

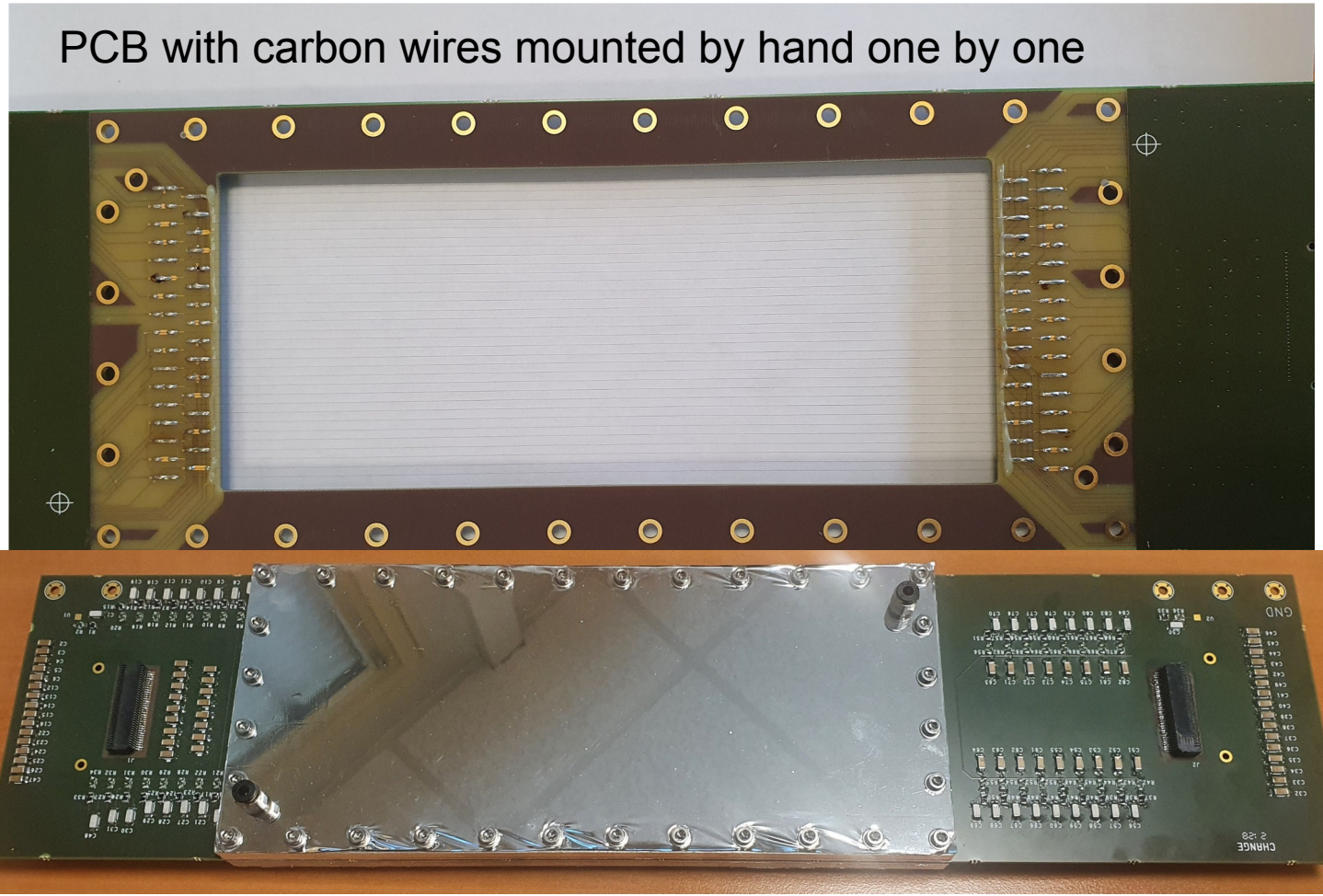
Built a versatile detector for all the tests

Only the PCB has to be changed



Mounting the detector 1/2

- 6 mechanics are built
- 15 PCB are available
- 5 different wires will be tested and readout on both sides
- Using weaving machine will be tested



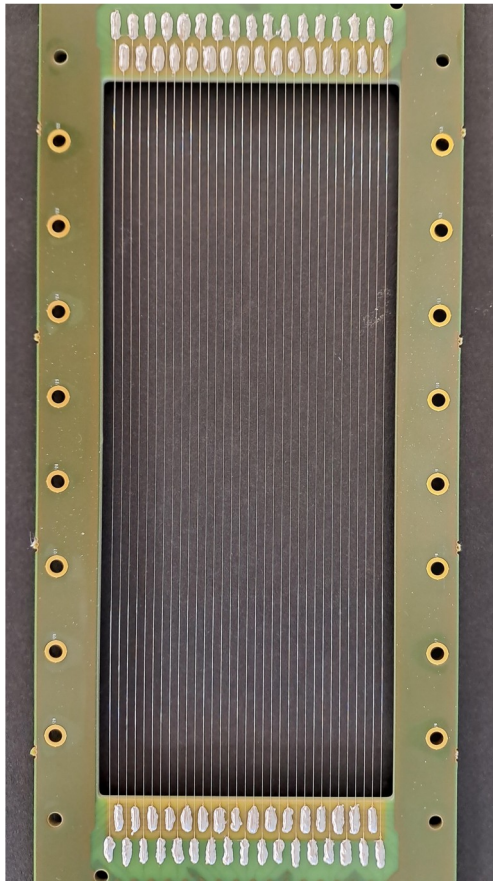
Mounting the detector 2/2

Welding Al wire can not be done with standard welding wire

Thanks to Marco Chiappini for sharing their work on welding wire for aluminum

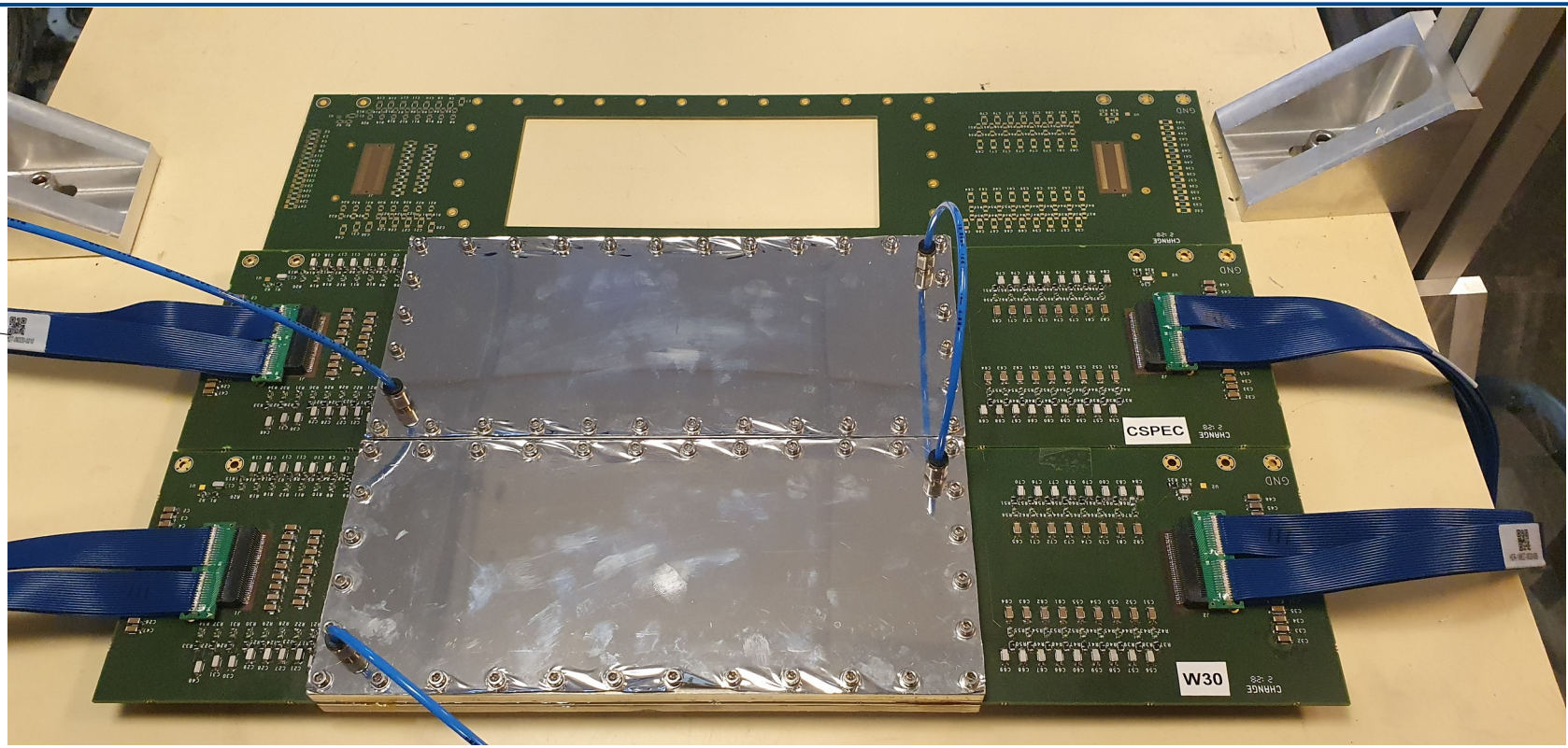
Method learnt at IN2P3 and used to build a detector with a turning wiring machine

Not yet tested



80 µm, AlMg5 wires

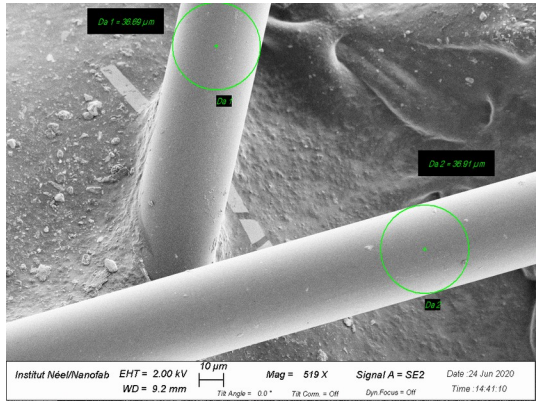
Tests



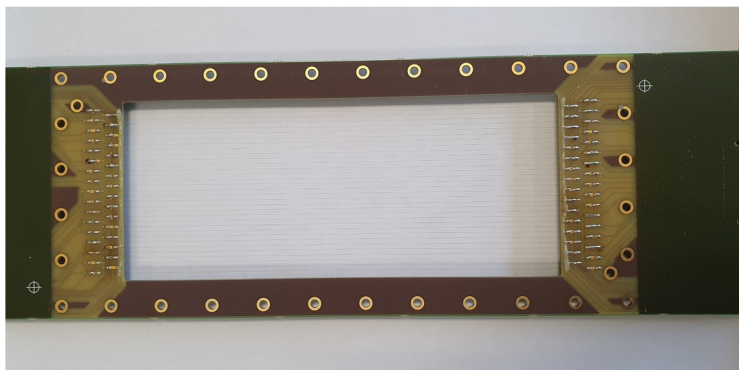
Gas line and readout ready
Tested with ^{55}Fe and ^{241}Am sources
Analysis is still ongoing but results with carbon wires are encouraging

New GEneration drift CHAmber

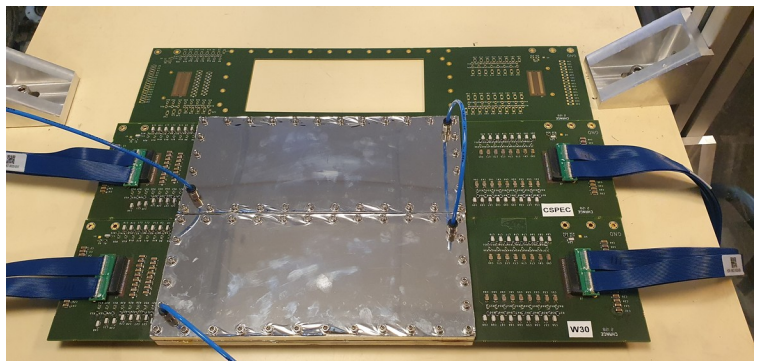
3 laboratories already implied
in this development



Tools ready to
test new wires
and quick to use



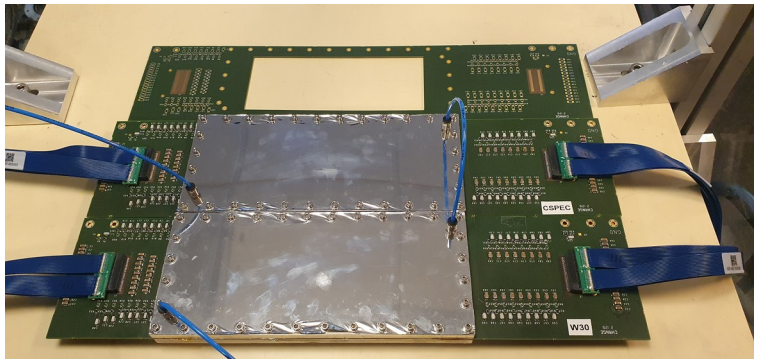
Carbon based wire plane
ROOM TO TEST OTHER IDEAS



Detectors with new PCB

New GEneration drift CHAmber: to come

3 laboratories already implied
in this development



Pile up the detectors

Cosmic bench

Ageing study?