## CHANGE New GEneration drift CHAmber

**Gabriel** Charles



One configuration possible for a drift/wire chamber



Creation of electron/ion pairs in the gas



#### Drift chamber



Electrons and ions drift toward the wires



#### A few examples of drift chambers



Crédit : photothèque in2p3



SED drift chamber at GANIL



ALICE drift chamber for di-muon arm

# Technology has not evolved much since the beginning in 70s



- Can cover large areas with low material budget
- · Uses gold platted 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
- $\mbox{ }$  Dimensions from  $\mbox{ cm}^2$  to 1  $\mbox{ m}^2$



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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

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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 of the carbon based wires to the property of the chambers

6) Ageing study of the carbon wires

7) Keep the knowledge of the teams

8) Keep the weaving machine working



#### CHANGE: aims

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Chosen strategy:

- 1) Make the use of carbon based wires standard
- 2) Develop reliable method to attach the carbon wires
- 3) Develop adapted weaving machines
- Test 2 types of carbon based wire 4) Adapte readout boards, if necessary
- 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

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

- 6) Ageing study of the carbon wires
- 7) Keep the knowledge of the teams
- 8) Keep the weaving machine working





### CHANGE: ordering and quality inspection of the wires



MEB view of type 1 wire



MEB view of type 2 wire after breaking



150 g for type 2, 50  $\mu$ m wire 11,5 g for type 1, 36  $\mu$ m wire



#### CHANGE: the mechanics

#### Built a versatile detector for all the tests



#### CHANGE: the detector



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## 3 mechanics are built (3 more to come) 5 PCB are available (20 more to come)

- 5 different wires will be tested and readout on both sides
- Using weaving machine will be tested



#### 29/10/2021 Joint French-Ukrainian workshop



#### **CHANGE: tests**



Gas line and readout ready. First tests showed micro-current => improvement on going

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#### New GEneration drift CHAmber







Carbon based wire plane ROOM TO TEST OTHER IDEAS



Detectors will be tested more

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