

# Détecteur de particule élémentaire RPC à grand taux de détection Physique des particules

Session « Plastiques » dans Horizon 2020

Lyon, le 23 septembre 2019

# Qui sommes-nous ?

- Institut de Physique des 2 infinis de Lyon
- Physicien des particules, expert en détecteurs des particules élémentaires
- AIDA, AIDA2020

## iRPC high rate detection capability

- ❑ Present CMS RPC chambers at CERN were certified to be efficient up to 300Hz/cm<sup>2</sup>
- ❑ Future experiments require > 100 higher rates

- ❑ Rate capability of the RPC is related to the voltage drop in the resistive plate:

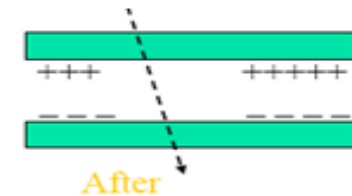
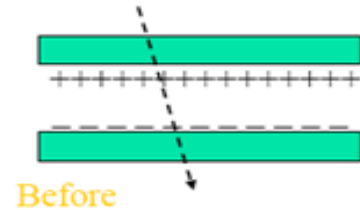
$$\Delta V = I R = q \rho d \Phi$$

To have RPC with increased rate capability one should reduce:

- *electrode resistivity*  $\rho$ : as low as the RPC principle still stands ( $> 10^9 \Omega\text{cm}$ )  
→ low-resistivity HPL or doped glass (Tsinghua glass)

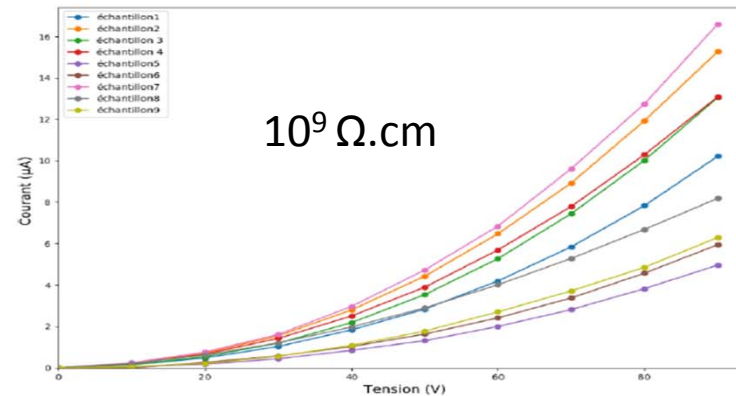
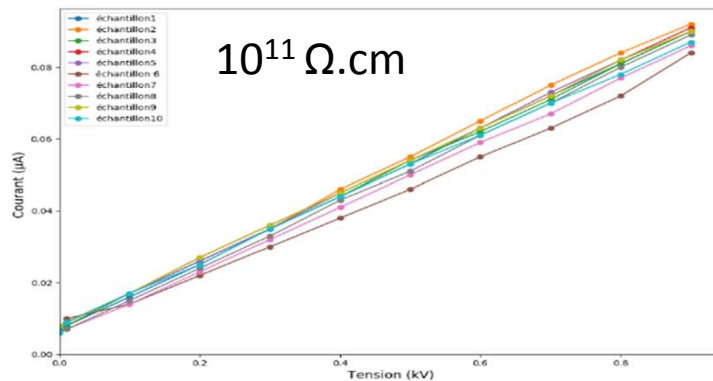
- *electrode thickness*  $d$ : depends on electrode material  
→ easy for glass, possible for HPL

- *produced charge*  $q$ : depends on gas mixture and number of gaps  
The less the charge produced, faster the eviction : beneficial also for chamber aging but this necessitates to *increase FE electronics sensitivity*



# Idea

- ❑ To dope thermoplastic materials such as PEEK with Carbon nanotubes or black carbon to reduce their electric resistivity to reach  $10^8$  - $10^9$   $\Omega$ .cm to reach  $10^5$  Hz/cm<sup>2</sup> rates. Preliminary work provided exciting results on small samples.



- ❑ Produce homogeneous large surface but thin plates

Application: Particle physics, astroparticles Physics , muon tomography ( home security, volcano, tunnels studies,.. etc)

# Consortium

<b><u>Partenaires / Offre de compétence</u></b>			
<b>Nom</b>	<b>Type</b>	<b>Pays</b>	<b>Rôle dans le projet</b>
IP2I	Institut de recherche	France	Réalisation du détecteur
IMP	Institut de recherche	France	Étude et conception du plastique chargé
<b><u>Recherche de partenaires</u></b>			
<b>Profil/compétences</b>	<b>Type</b>	<b>Pays</b>	<b>Rôle dans le projet</b>
Injection/extrusion multicouche	entre prise		Réalisation des plaques de grande taille

# Coordonnées

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