GASEOUS DETECTORS R&D

LIP COIMBRA | DEPARTMENT OF PHYSICS | 4th FLOOR | ROOMS G.17 & G.18

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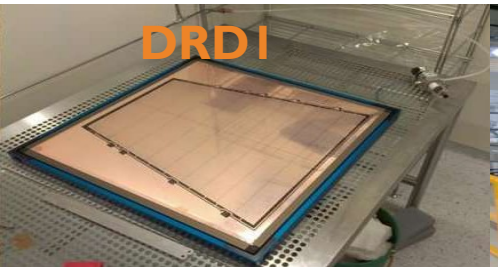
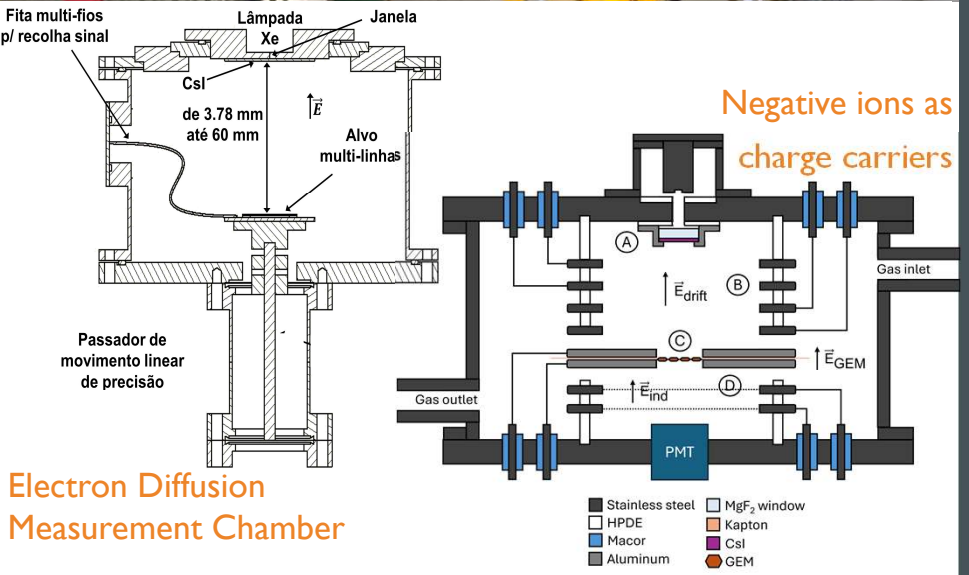
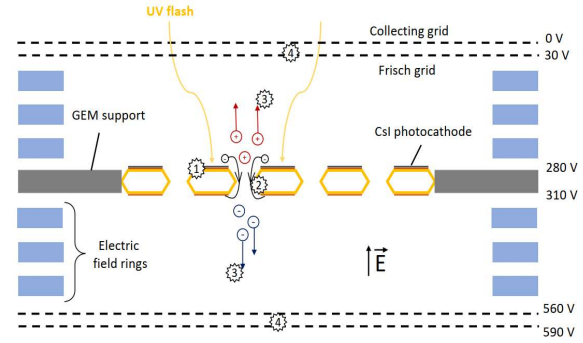




Electron Diffusion Measurement Chamber



Dual Polarity Ion Drift Chamber (DP-IDC)

GASEOUS DETECTORS R&D

- **Design and planning of gas detectors and other devices**;
- **Study of gas mixtures:** optimize electron diffusion, stopping power, energy resolution – without compromizing important properties of the main gas;
- **Exploring ecofriendly gases** (CERN-DRD1) – European project submission within DRD1 (our group is responsible for the study of gas mixtures)
- **Drift of electrons and ions** (positive and negative) in gases;
- **Custom Monte Carlo simulation** to explain experimental results (now on hold);
- **Electronegative additives in noble gases:** charge transport, electron dettachment, charge multiplication, light production;

Ongoing work:

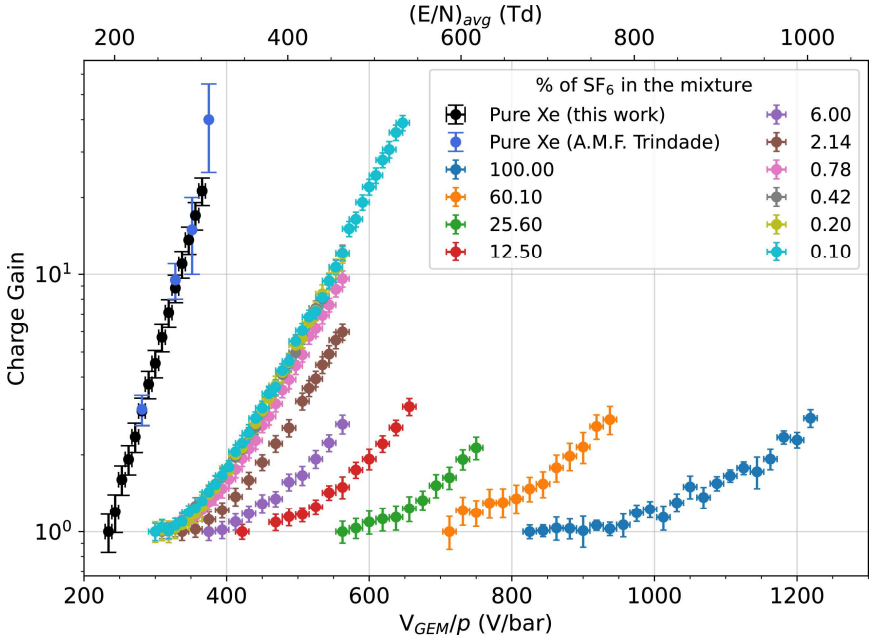
- **Negative Ions as Charge Carriers in Gaseous Detectors**;
- **Complementary studies on negative ions;**
- **Dual Polarity Ion Drift Chamber (DP-IDC);**
- **Electron Diffusion Measurements**;
- **New device to study drift velocity** (under construction);

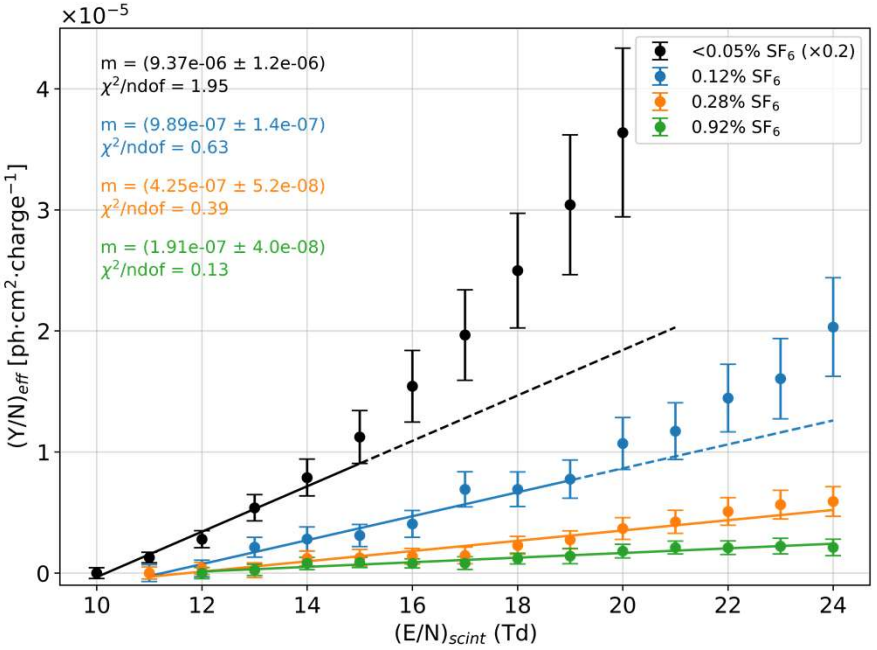
International collaborations:

- **NEXT** (Neutrino Experiment with a Xe TPC);
- **DRD1** (CERN Collaboration) – european project to be submitted;
- **Astrocent/CAMK PAN (Poland)**

NEW RESULTS

- Electron stripping from ion
- Charge multiplication in the GEM





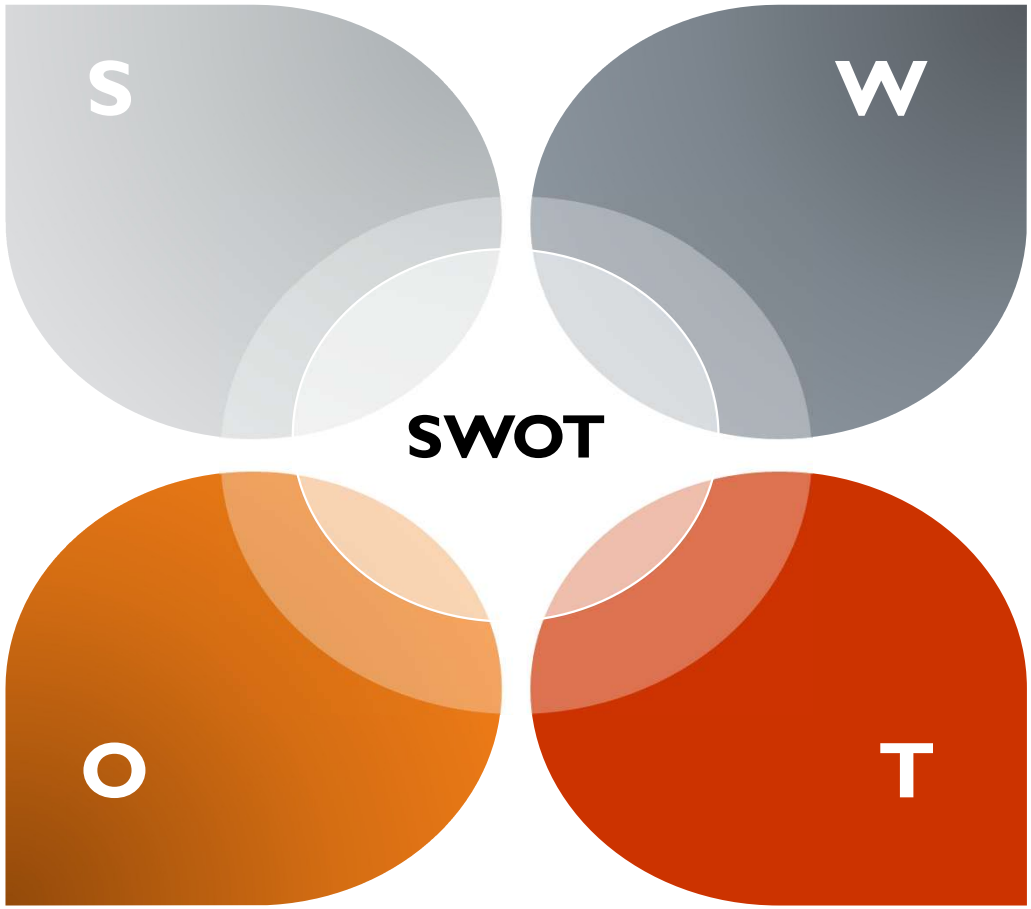
- Light production under a uniform electric field region, after GEM.
- At these SF_6 concentration, proportional light can still be observed

STRENGTHS

- In the past 3 to 4 years:
  - 10 students in summer internships and 2 students in curricular internships
  - 1 PhD student + 1 finished PhD
  - **2 BSc project thesis in Biomedical Engineering + 2 ongoing**
- Theoretical, simulational and experimental experience/know-how
- Strong presence in the NEXT Collaboration
- Good involvement with young researchers

OPPORTUNITIES

- Successful student internships leading to MSc and PhD projects
- Negative ions as charge carriers in noble gases may provide necessary information accuracy on rare-event experiments
- New perspectives within NEXT Collaboration with negative ions



WEAKNESSES

- Lack of/very limited and non-stable internal and external funding leading to less projects, grant holders, laboratory material and, ultimately, results
- Reduced number of early career researchers

THREATS

- Irregularity in funding projects (FCT, mainly)
- Difficulty in having stable team due to lack of financing