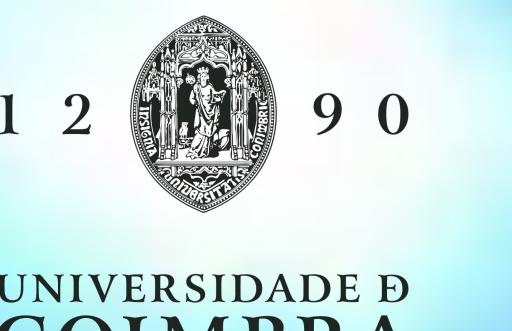


Electroluminescence yield of He-CF₄-isobutane mixtures

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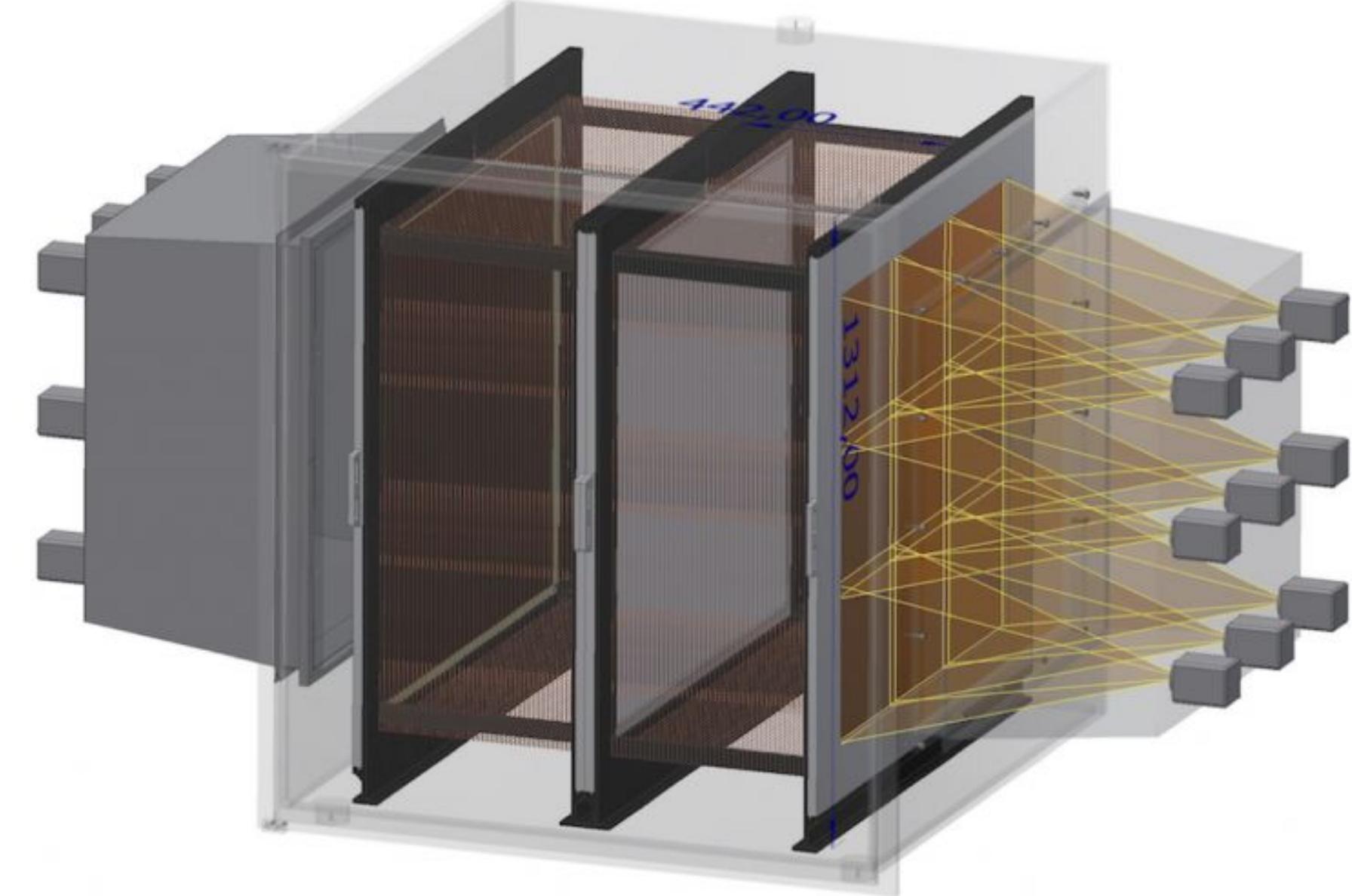
CYGNO gas mixture

The gas mixture for the CYGNO optical TPC is being tuned to search and identify a clear Dark Matter signature for low WIMP mass (1-10 GeV).

Base Mixture:

Helium: 60%

- Extends the sensitivity to low WIMP masses;
- Allows 1 atm operation.



Schematics of the CYGNO 1 m³ demonstrator.

CF₄: 40%

- Improves gas scintillation;
- Highly sensitive to Spin Dependent Coupling.

Additive: Low mass targets (H-based) are essential to access low WIMP mass.

Isobutane (i-C₄H₁₀): ?%

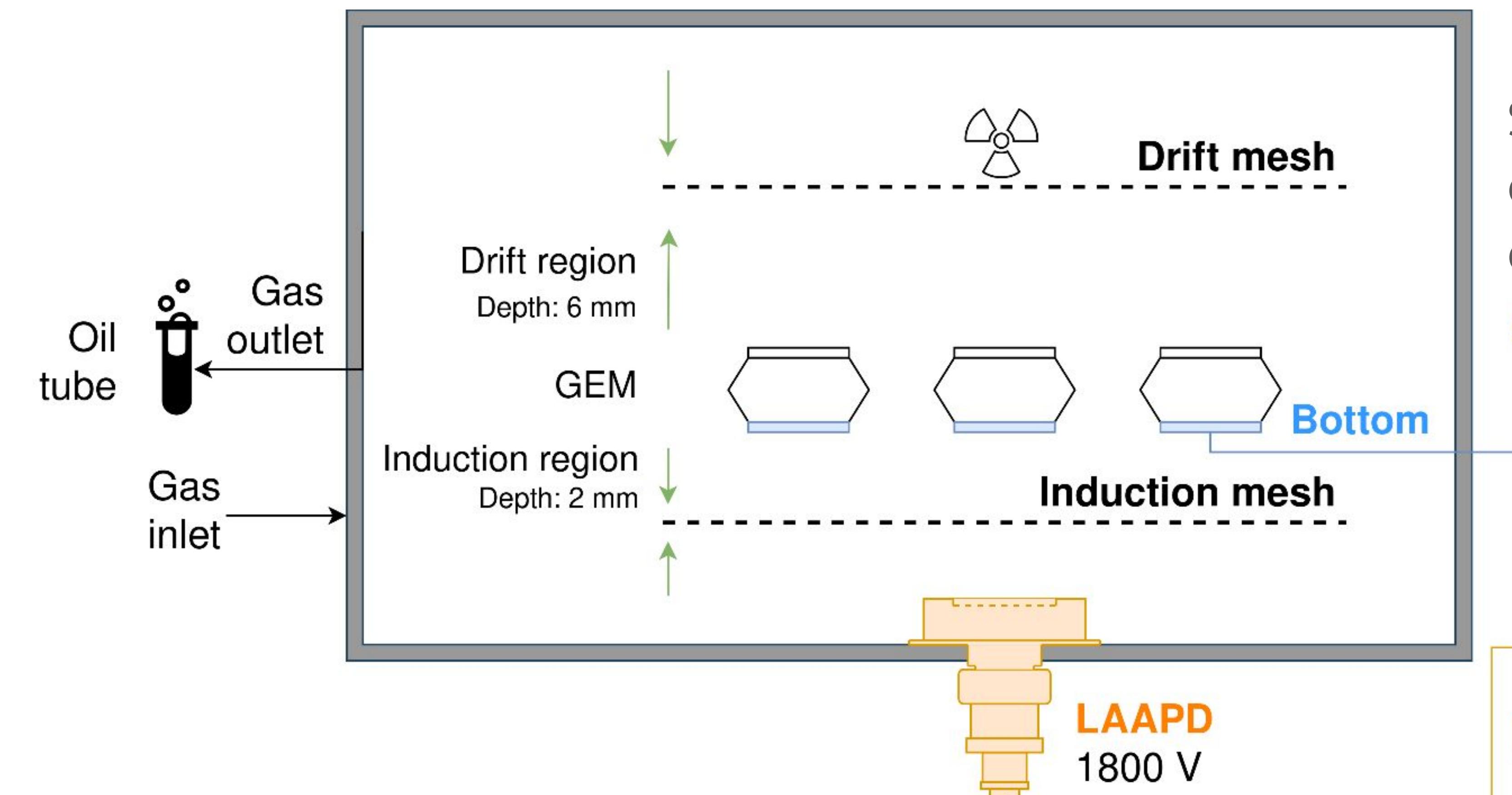
- Improves gas tracking properties;
- Maintains low target mass.

Goal

Study the influence of isobutane in the charge and electroluminescence, EL, signals of the mixture.

Experiment setup

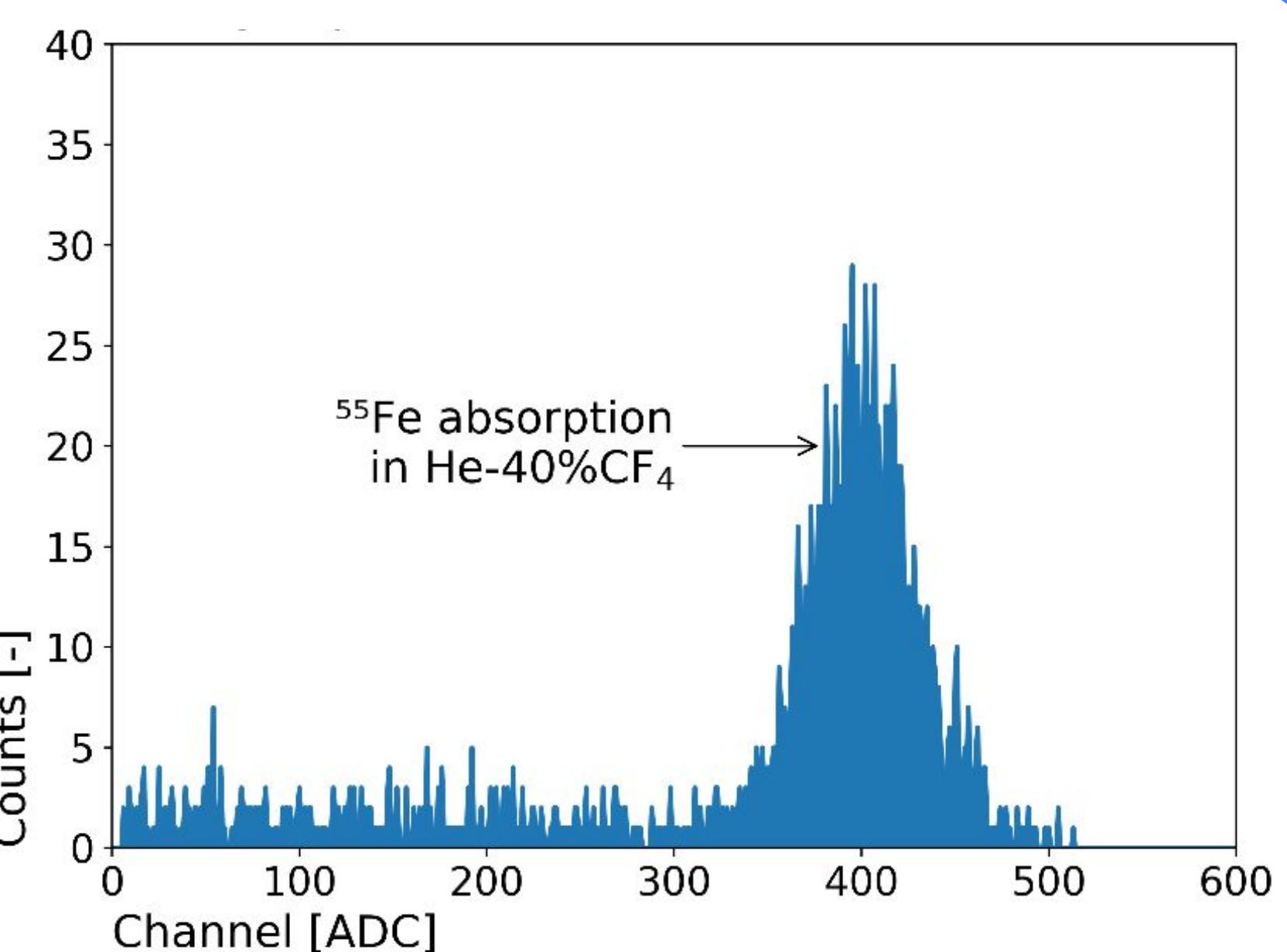
Detector operates in continuous flow mode at atmospheric pressure.



Gas Flow: we kept He/CF₄ (60/40) flowing at 4 L/h and then added the required % of isobutane (1% - 5%).

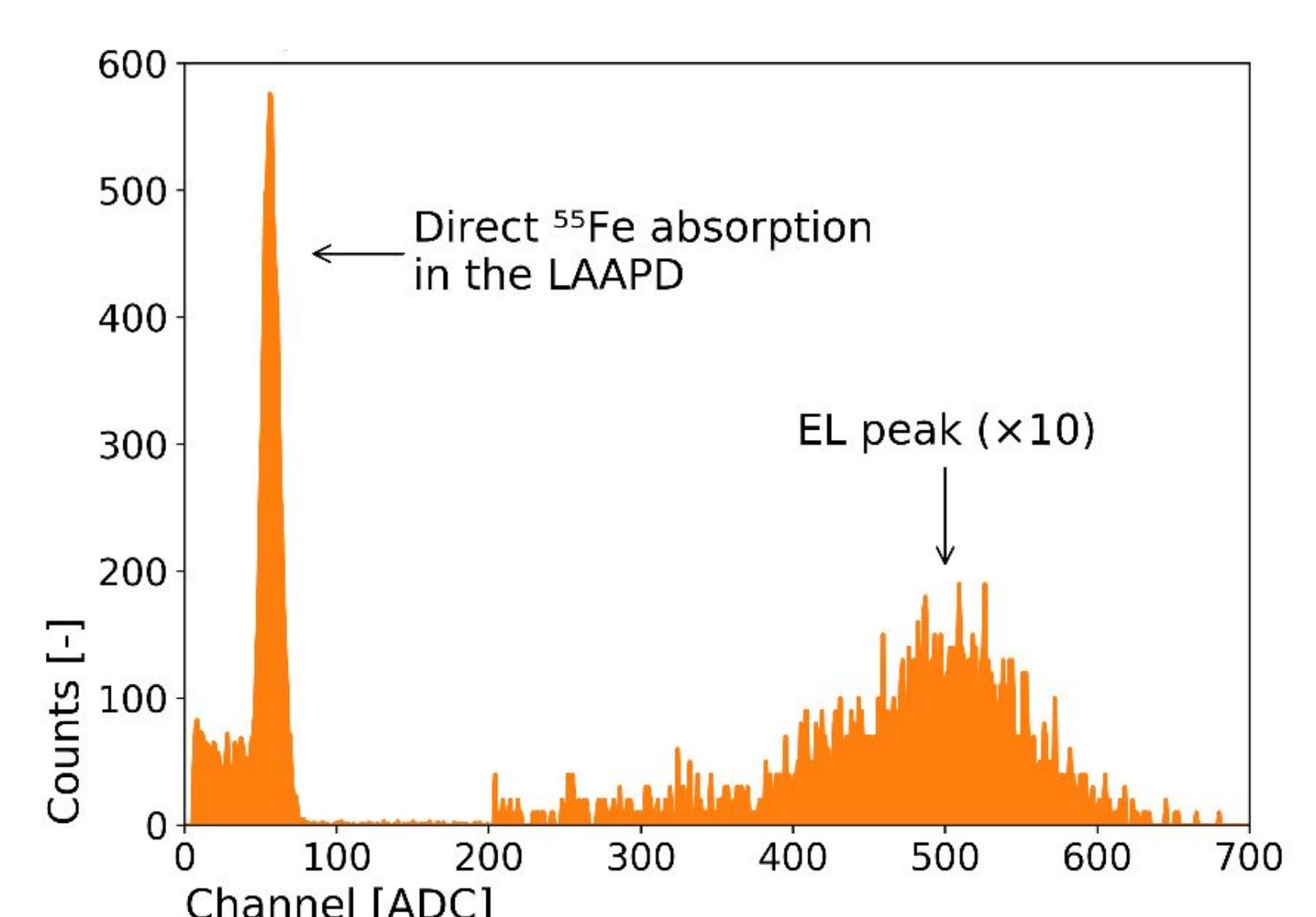
Secondary electrons are collected at the bottom electrode of the GEM.

Charge readout



LAAPD readout

The LAAPD detects the EL photons produced in the GEM avalanches and a fraction of the x-rays that do not interact in the gas.



Results: Adding isobutane to He-CF₄ (60/40) decreases the amount of EL photons but does not compromise the EL readout and is therefore a good option to study for possible applications in the CYGNO-TPC.

