

# Production and characterization of novel optical amplification structures (FAT-GEMs)

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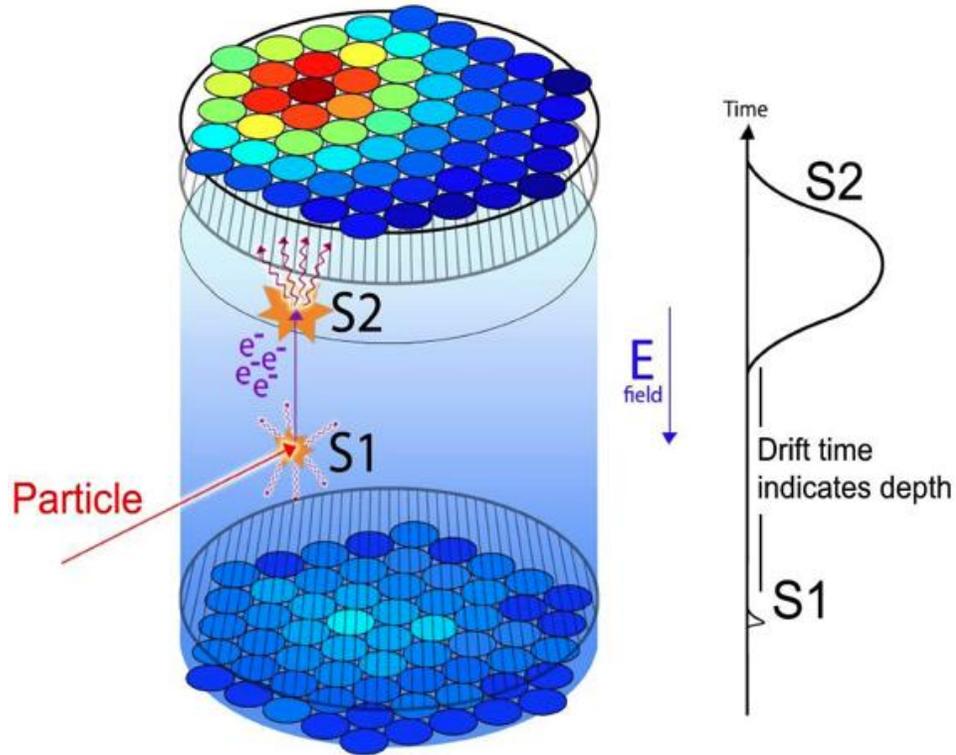
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# Contextualization: Ar-based DM detectors



- Ar **VUV (128 nm)** scintillation.
- Trend toward **larger-volume** detectors.
- **Low-background** experiments
- **Wires and parallel meshes** provide **great energy resolution** **BUT** they are **not ideal for large areas**:
  - Loss of tension with time
  - Lack of modularity
  - Coupling with WLS

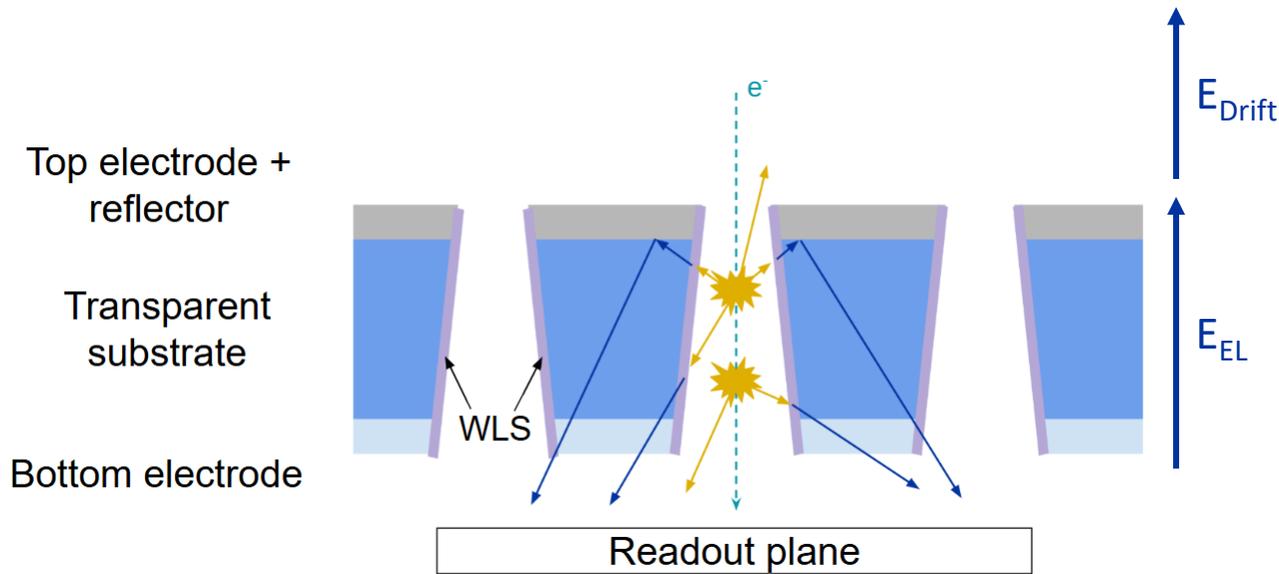
## Field Assisted Transparent Gas Electroluminescence Multiplier

- Integration with WLS coatings
- Modular, tileable, and radiopure
- Robust mechanical design
- Suitable for cryogenic operation
- Customizable

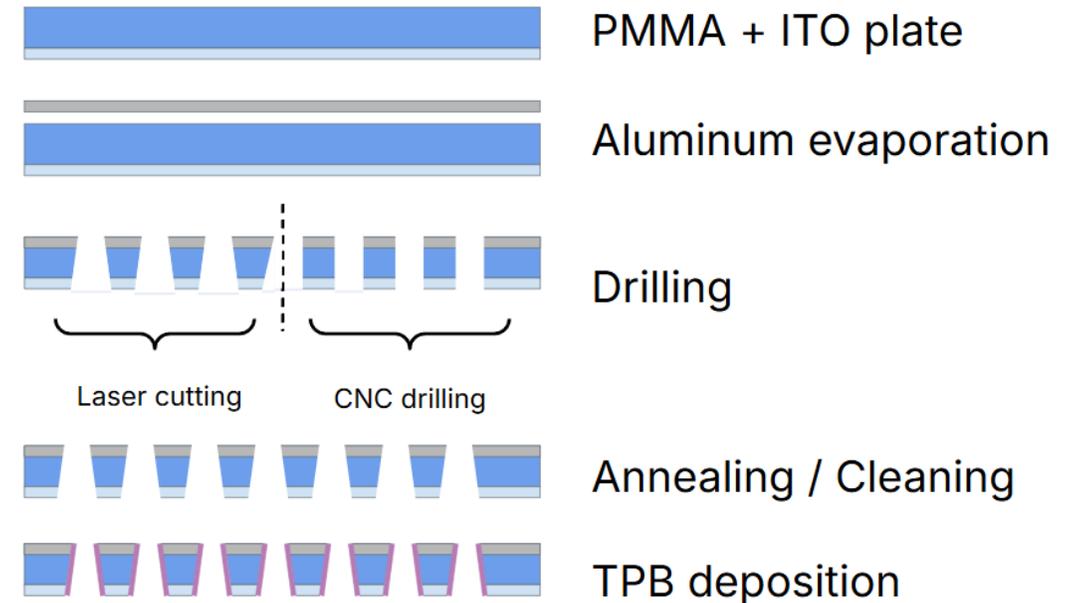


# FAT-GEM production

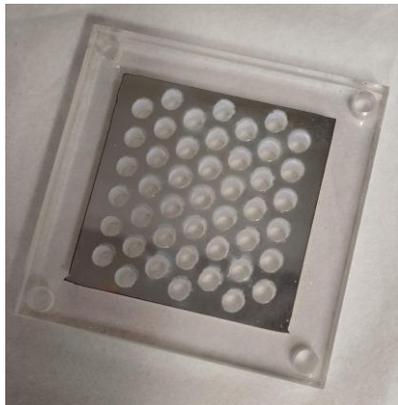
- How does it work?



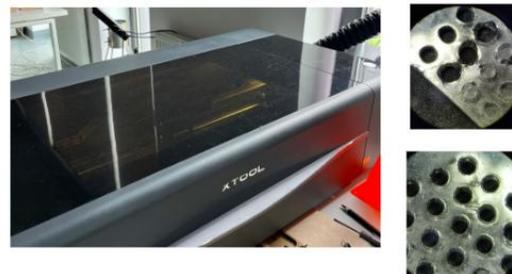
- Manufacture process:



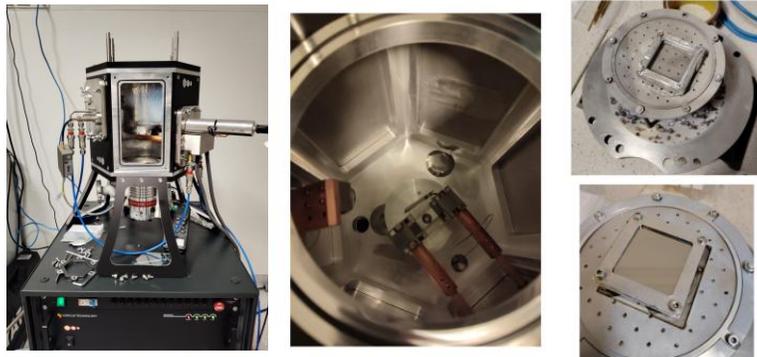
# FAT-GEM production



Laser cutting



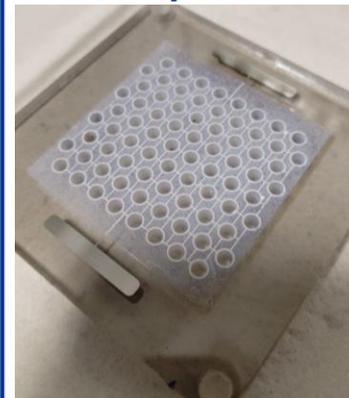
Aluminum evaporation



Annealing



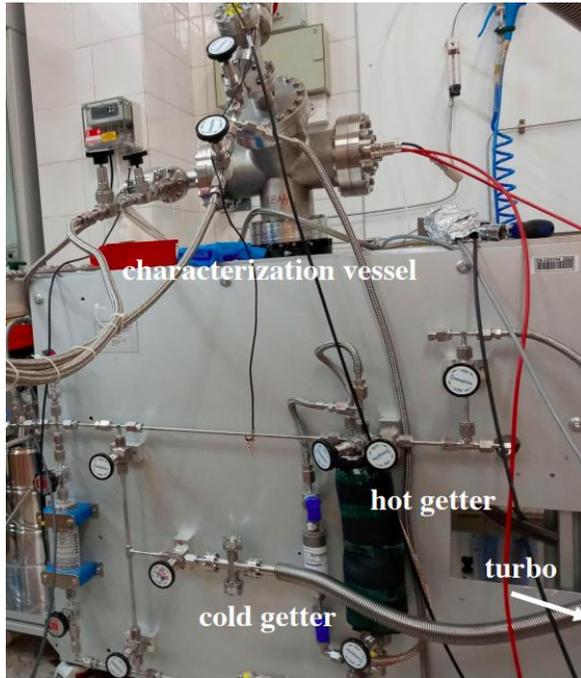
WLS evaporation



Testing



# Quality Assurance & Next steps



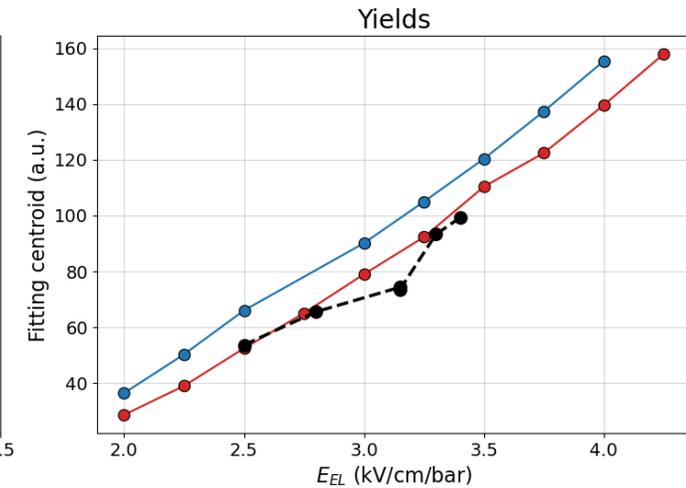
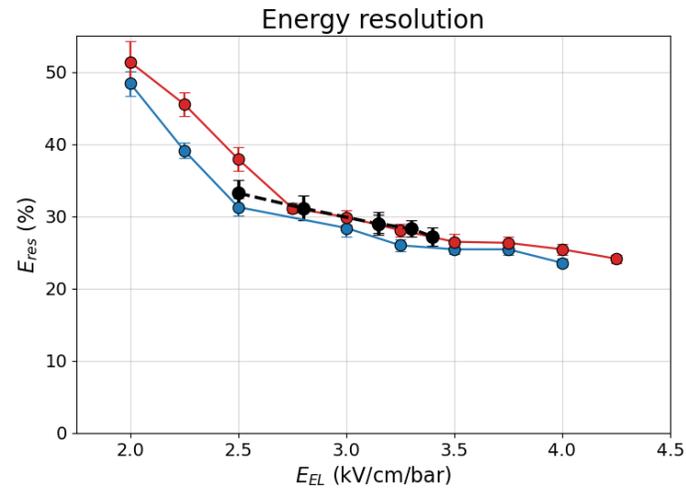
**GA** at 4 bar and 293 K (LAr density equivalent) using a 5.9 keV X-ray source

## QA main results:

- Extended range of pressure-reduced electrical field.
- 20% improvement in light yield respect to previous productions.

## What's next?:

- Cryogenic operation tests (ongoing)
- S1-optimized structures produced @CERN
- Simulation work (P.A.O.C. Silva)



—●— C —●— E —●— S. Leardini et al. 2024

**\*\*Conference proceeding submitted:** Production of GEM-like structures for cryogenic applications, using laser-cutting techniques

# Other Projects & Scientific Activities

- **Other projects:**
  - vPDU QA testing for **DarkSide-20k**
  - Contributing to **DUNE ND-GAr (GAT0)** (USC)
- **Conferences/Meetings/Workshops:**
  - **LIDINE 2025**, Hong Kong (Hong Kong) - October 2025  
Talk, Poster \* *Best Poster Award*
  - **6th DRD1 Collaboration Meeting**, Warsaw (Poland) - October 2025  
Talk, Poster
  - **DRD1 Gaseous Detectors School**, Bonn (Germany) - September 2025
- Submitted **PRELUDIUM-24** proposal
- **Courses:**
  - Introduction to Modern Cosmology
  - Introduction to LaTeX
  - Philosophy of Science

