

# CENPA

Center for Experimental Nuclear Physics and Astrophysics  
University of Washington

## Physics beyond the Standard Model

- Muon g-2 (Breakthrough Prize)
- He-6 beta decay
- Rare pion decays

## Fundamental neutrino properties

- Direct mass measurements
- Neutrinoless double beta decay

## Dark Matter searches

- ADMX Axion Dark Matter Experiment
- DAMIC

## Tests of Gravity (Breakthrough Prize)

- Big G and  $1/r^2$
- Equivalence Principle



# LEGEND

Large Enriched  
Germanium Experiment  
for Neutrinoless  $\beta\beta$  Decay

Composite view of the LEGEND-200 detector under visible light (top) and UV light (bottom) illumination, before immersion in liquid argon. Germanium detectors are mounted on scintillating PEN plastic supports, hanging from electroformed copper rods. Some strings are already shrouded by TPB-coated low-activity nylon tubes for background suppression. Bundles of TPB-coated, wavelength-shifting optical fibers collect scintillation light from the liquid argon bath, acting as an anti-coincidence veto for background events.



Interior of the cryogenic stage of the He6-CRES detector located at CENPA. Femtowatt-power microwaves produced by electrons and positrons travel down long waveguides entering the image through the circular hole on the bottom right. At the center is the 5 Kelvin stage holding low noise amplifiers (LNAs) which increase the power of these signals so they may be detected by room-temperature RF electronics. The system was open for testing, and various parts can be seen such as wires for sensors and aluminized mylar (pulled back) used to shield from radiative heating.

<sup>6</sup>He-CRES



# Center for Experimental Nuclear Physics and Astrophysics

# W

A DOE Center of Excellence

- Office of Science,  
Nuclear Physics Division

Additional support for some projects

- DOE-High Energy Physics  
and NSF-Gravity

3 Breakthrough Prizes for Fundamental Physics

3 Members of the National Academy of Science

14 Faculty (teaching, research, and emeritus)

- Major leadership in all projects below

11 Postdoctoral Fellows & 4 Research Scientists

11 Professional Staff

17-20 Graduate Students & many undergraduates

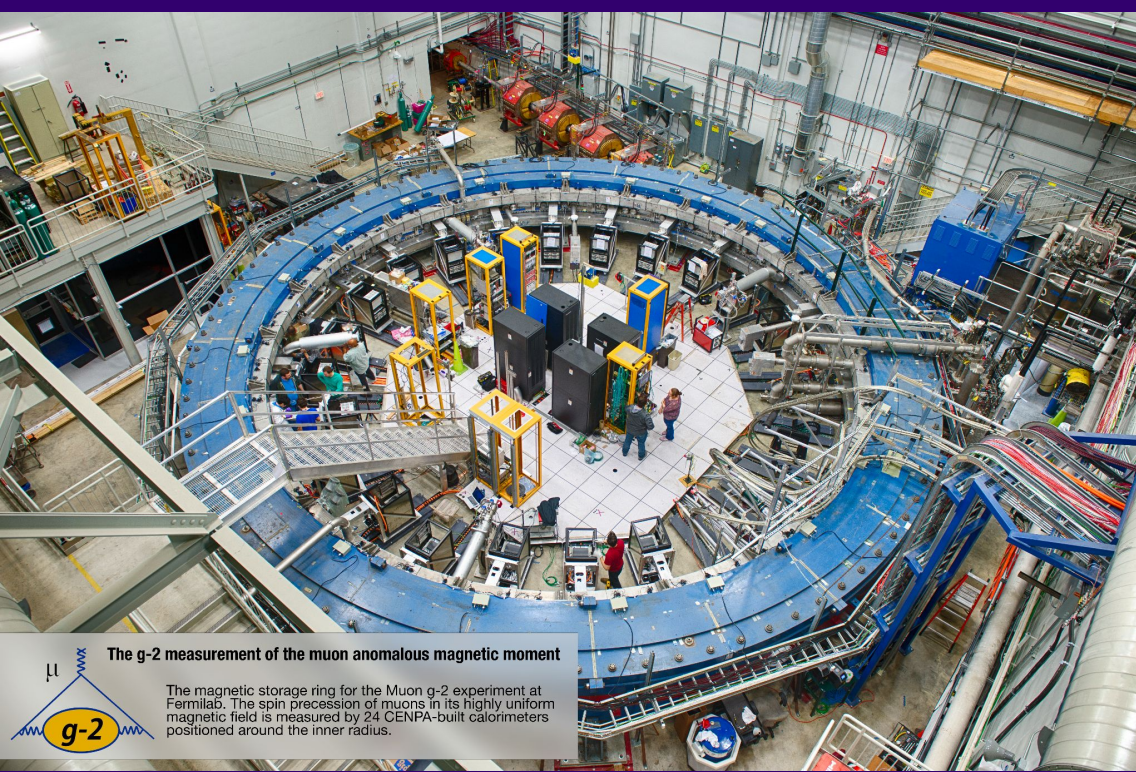
An operating Van de Graaff accelerator, machine shops, electronics shop, engineering center

David W. Hertzog, Director; [hertzog@uw.edu](mailto:hertzog@uw.edu)



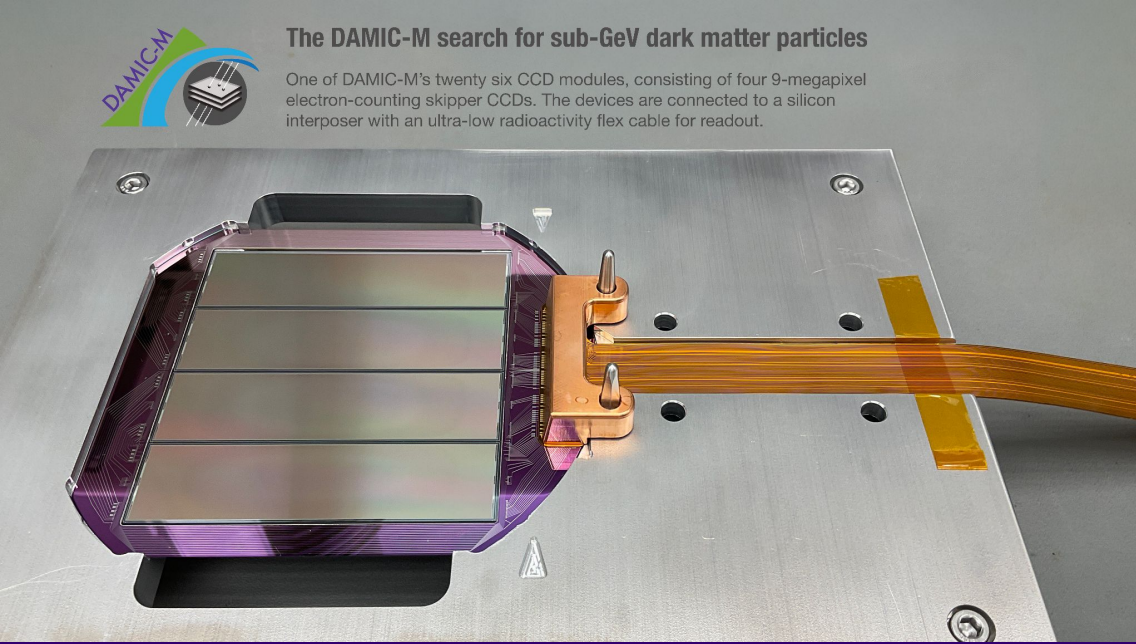
Tours Available: Gary Holman; [holman@uw.edu](mailto:holman@uw.edu)

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**The g-2 measurement of the muon anomalous magnetic moment**

The magnetic storage ring for the Muon g-2 experiment at Fermilab. The spin precession of muons in its highly uniform magnetic field is measured by 24 CENPA-built calorimeters positioned around the inner radius.



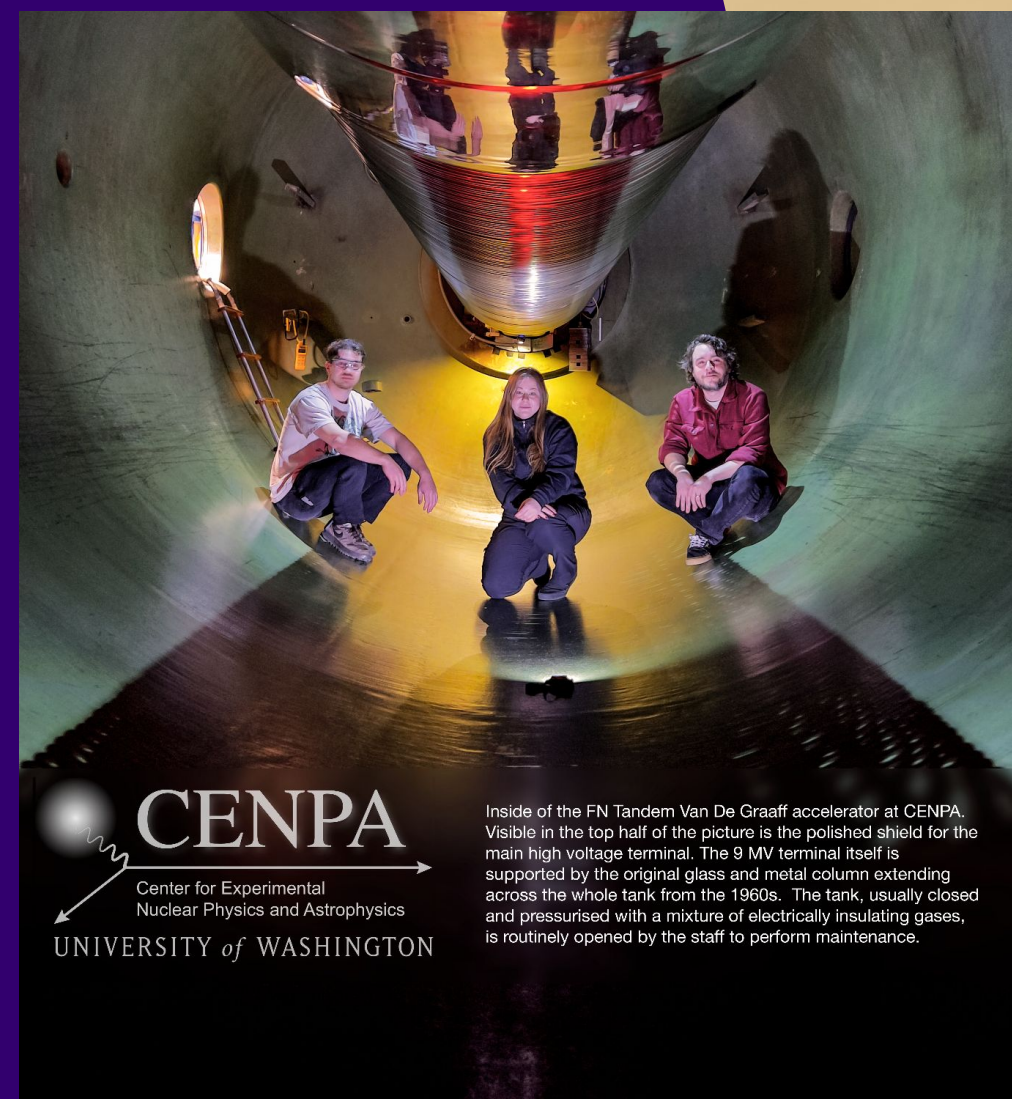
**The DAMIC-M search for sub-GeV dark matter particles**

One of DAMIC-M's twenty six CCD modules, consisting of four 9-megapixel electron-counting skipper CCDs. The devices are connected to a silicon interposer with an ultra-low radioactivity flex cable for readout.



**ADMX**  
AXION DARK MATTER EXPERIMENT

The ADMX insert is being extracted from the magnet bore and moved into the clean room for testing and repairs of the quantum electronics package.

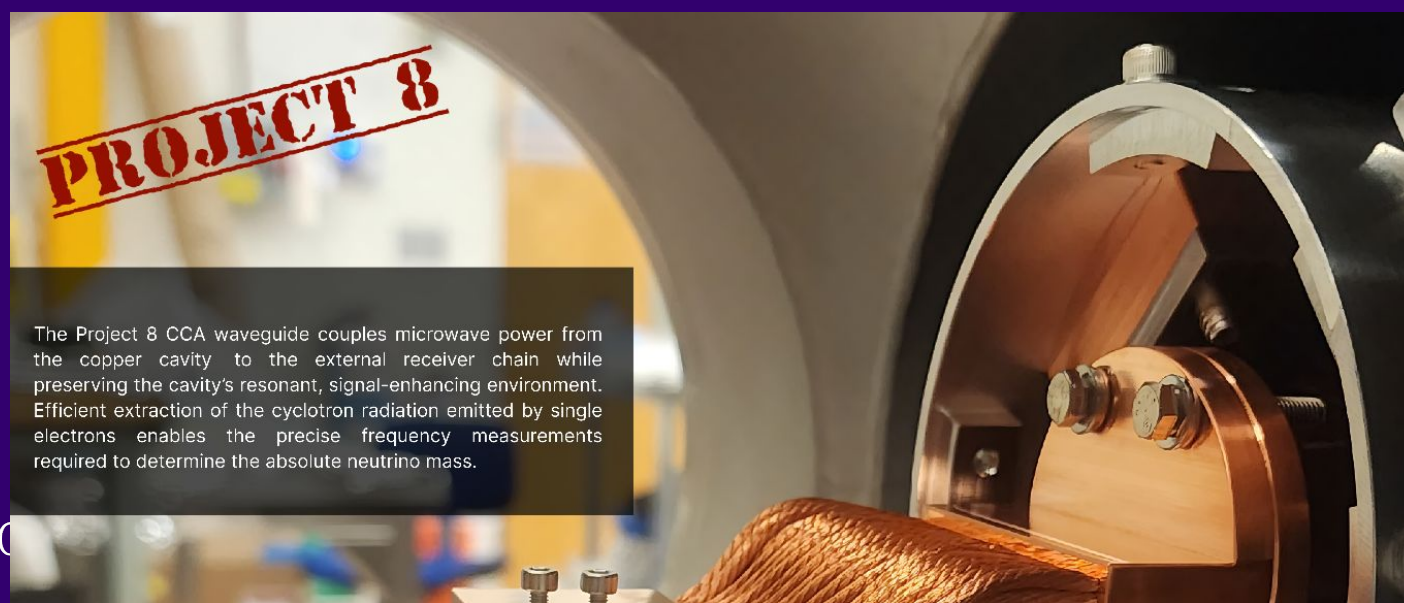


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Inside of the FN Tandem Van De Graaff accelerator at CENPA. Visible in the top half of the picture is the polished shield for the main high voltage terminal. The 9 MV terminal itself is supported by the original glass and metal column extending across the whole tank from the 1960s. The tank, usually closed and pressurised with a mixture of electrically insulating gases, is routinely opened by the staff to perform maintenance.

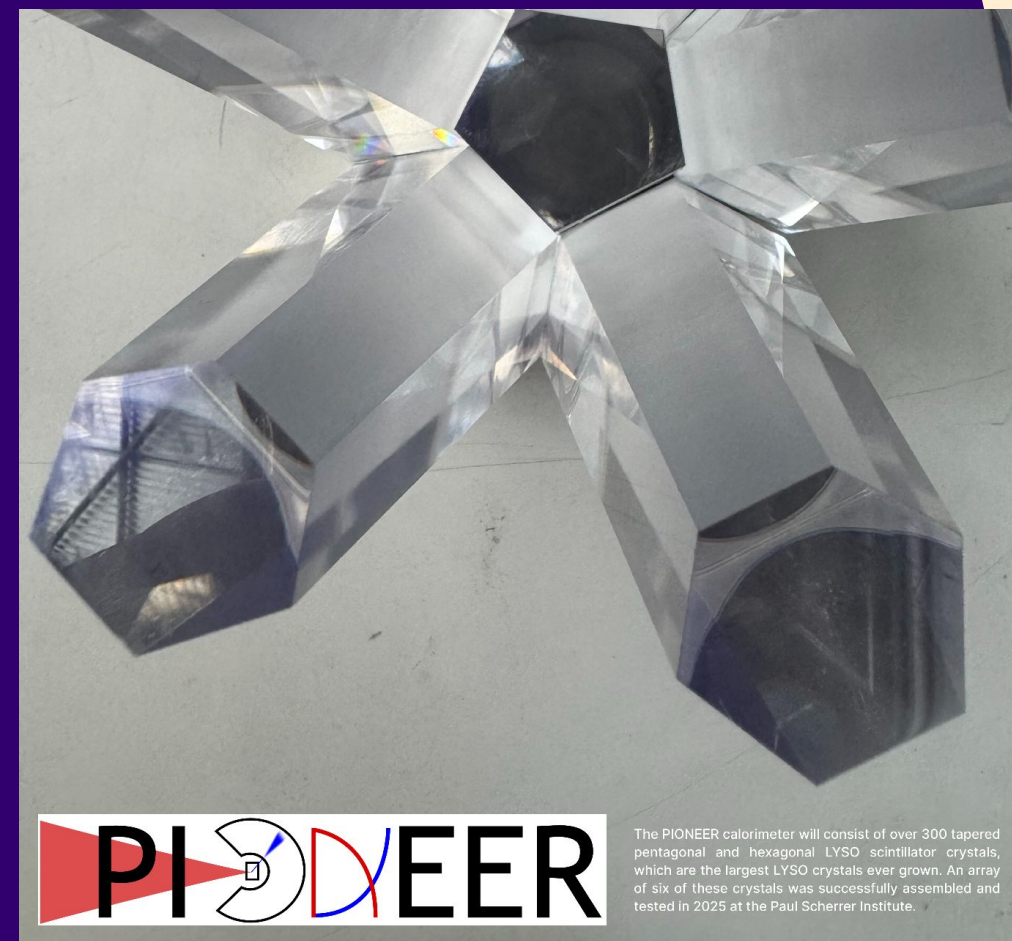


**Eöt-Wash**  
Gravity Group  
Torsion balance apparatus for testing the short range behavior of gravity.



**PROJECT 8**

The Project 8 CCA waveguide couples microwave power from the copper cavity to the external receiver chain while preserving the cavity's resonant, signal-enhancing environment. Efficient extraction of the cyclotron radiation emitted by single electrons enables the precise frequency measurements required to determine the absolute neutrino mass.



**PIONEER**

The PIONEER calorimeter will consist of over 300 tapered pentagonal and hexagonal LYSO scintillator crystals, which are the largest LYSO crystals ever grown. An array of six of these crystals was successfully assembled and tested in 2025 at the Paul Scherrer Institute.