



MAX-PLANCK-GESELLSCHAFT



# GERDA Phase-I Detector Commissioning

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M. Barnabé Heider for the GERDA collaboration

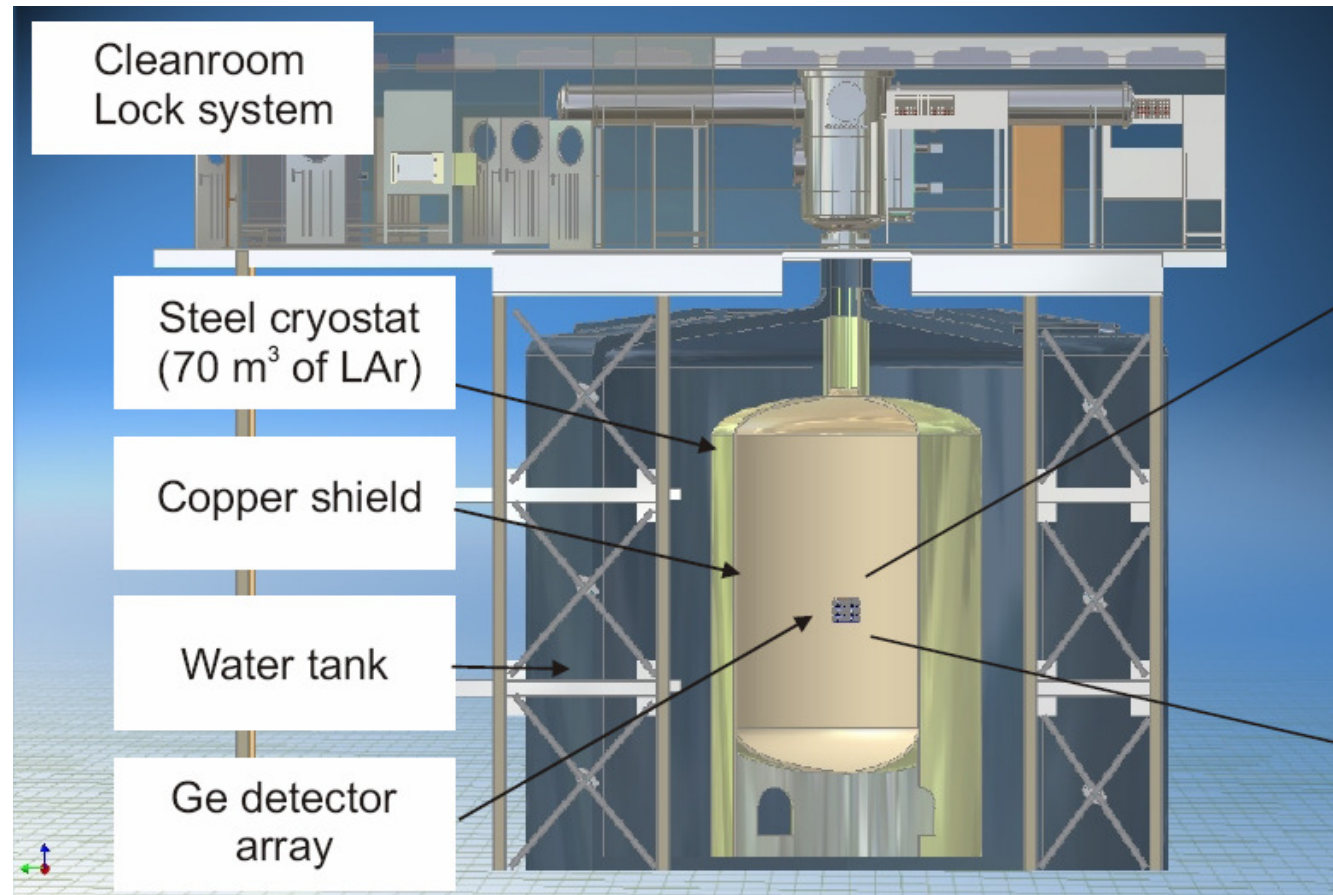
# Outline

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- The GERDA experiment at LNGS
- **Phase-I detector-signal chain integration**
  - Setup
  - Result
- Coming soon: non-enriched / enriched detector deployment in GERDA



# GERmanium Detector Array for the search of neutrinoless $\beta\beta$ decays of $^{76}\text{Ge}$



## Phase-I



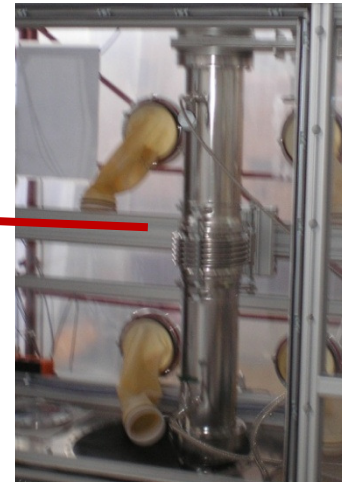
### Bare enriched HPGGe detectors in LAr

- Extremely low background ( $B \sim 10^{-2} / 10^{-3} \text{ cts} / (\text{keV} \cdot \text{kg} \cdot \text{y})$ )
- Excellent energy resolution (FWHM  $\sim 3 \text{ keV}$ )

- Reprocessed HDM and IGEX detectors (17.9 kg)
- Genius-TF detectors (15 kg)

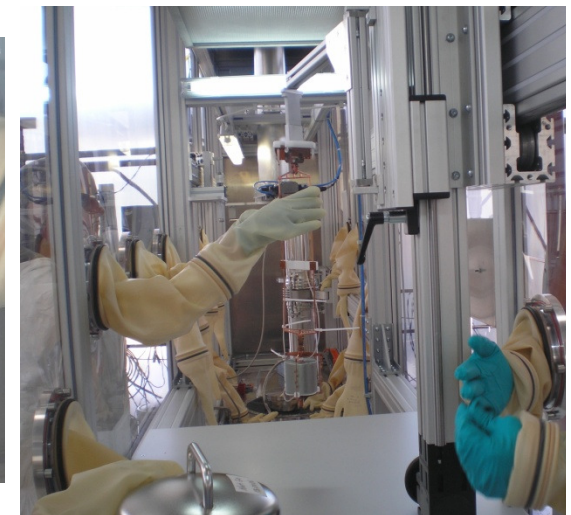
# Phase-I detector-signal chain integration

Setup in the LNGS Hall di Montaggio (June-Sep 2009)



Lock for  
insertion of  
detector  
strings

Glove box  
for detector  
handling  
under N<sub>2</sub>  
atmosphere



# Phase-I detector-signal chain integration

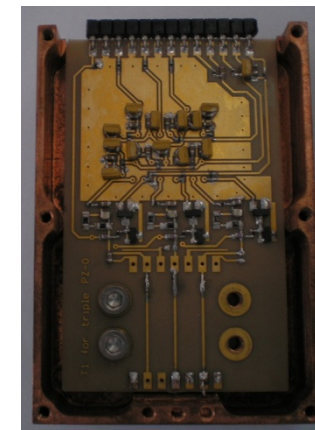
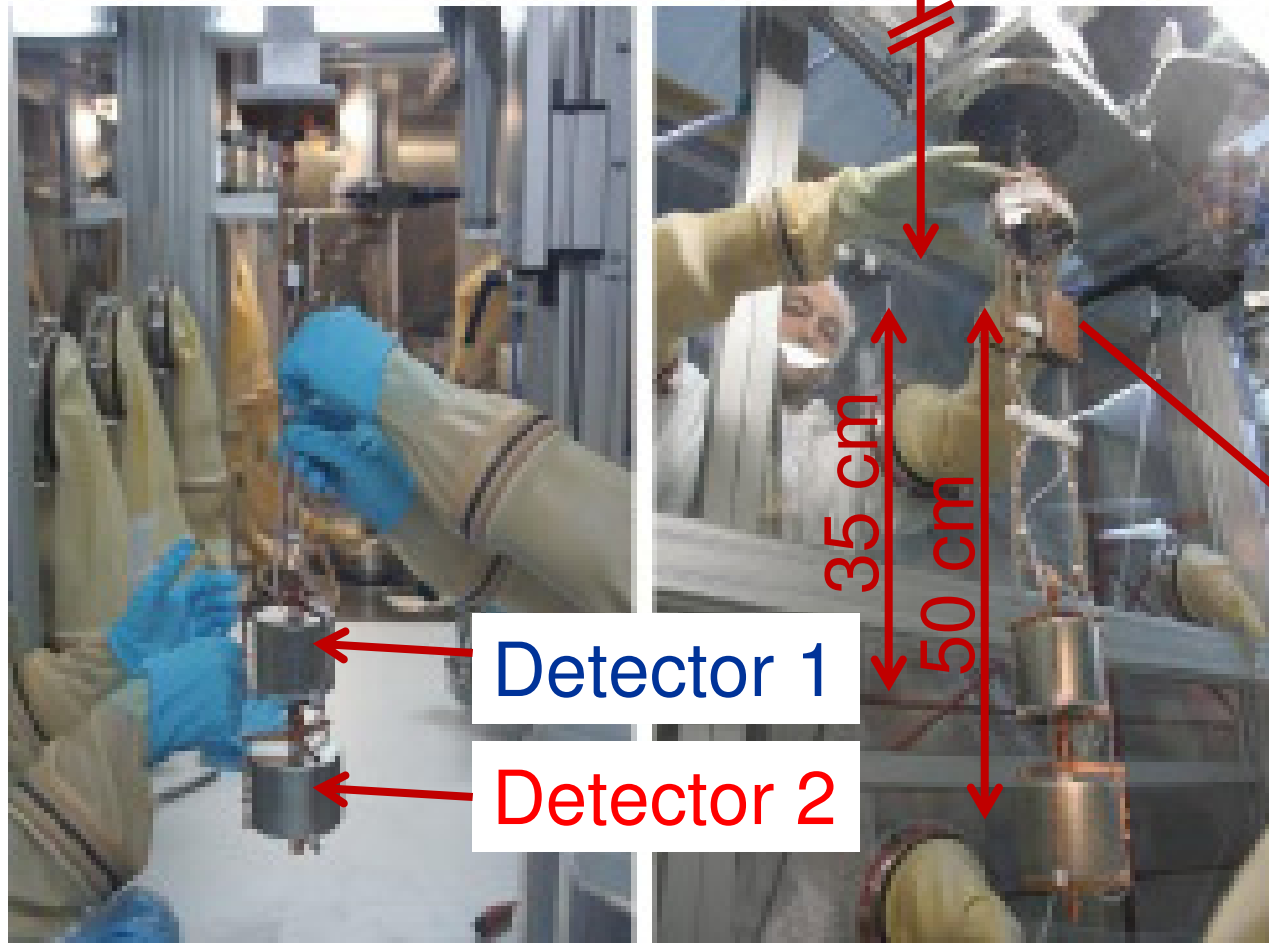
- Integration test of

- ◆ Phase-I detector string
- ◆ FE electronics

- ◆ Commissioning lock
- ◆ DAQ

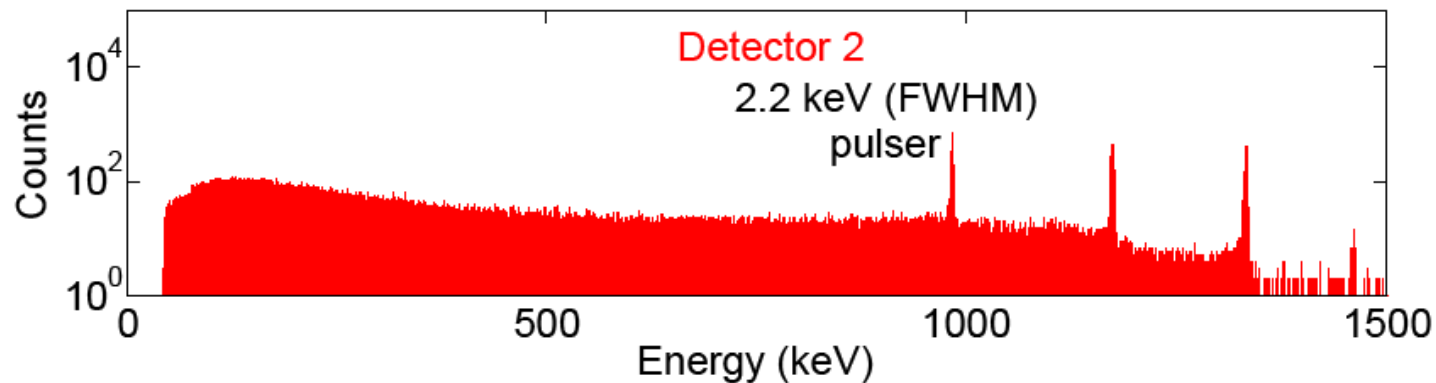
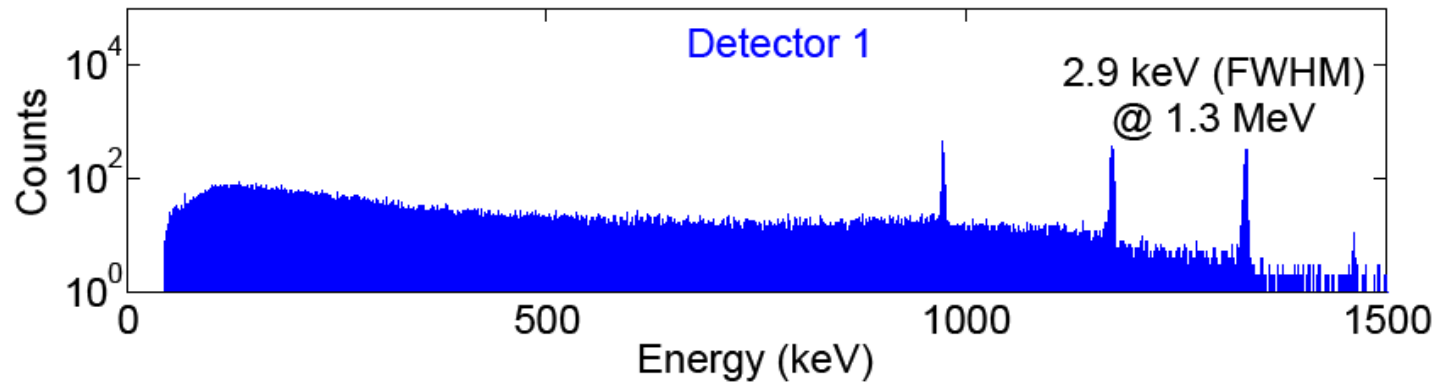
## Tests

1. Detector mockups & 3 x capacitors ( $C=33\text{ pF}$ )
2. Single detector string & 2 x capacitors
3. 2 detector string & 1 x capacitor



The 3-channel CSA  
based on the PZ0 ASIC

# Phase-I detector-signal chain integration



- ⇒ **Good spectroscopy performance**
- ⇒ **Several thermal cycles and no leakage current increase**

Sepctroscopic performance - FWHM (keV)

	Pulsar (1 MeV)	<sup>60</sup> Co (1.3 MeV)
C on board	1.2	-
C in pos.1	1.8	-
Detector 1	2.2	2.9
Detector 2	2.2	2.9

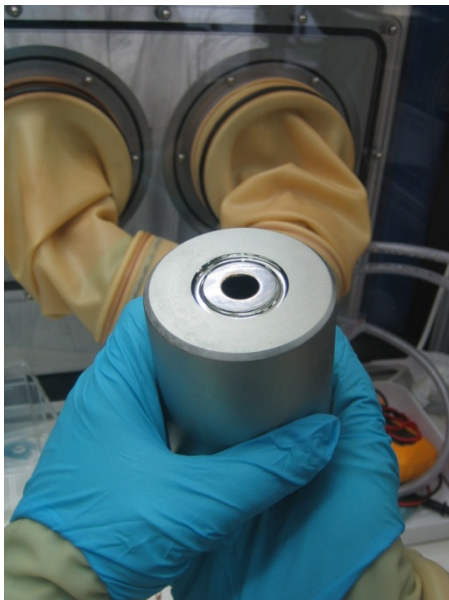
Glove box inside the GERDA clean room



# Phase-I detectors



Ge diodes before and after the reprocessing



## 8 diodes (from HdM, IGEX):

- Enriched 86% in  $^{76}\text{Ge}$
- All diodes reprocessed with new contacts optimized for LAr
- Well tested procedure for detector handling
- Long term stability in LAr established
- All detectors mounted in low-mass holder & tested in LAr
- Energy resolution in LAr:  $\sim 2.5$  keV (FWHM) @1.3 MeV
- Total mass 17.66 kg

## 6 diodes from Genius-TF $^{\text{nat}}\text{Ge}$ :

- Same reprocessing & testing as enriched diodes
- Total mass: 15.60 kg



Low-mass holder and electrical contacts



# Summary and outlook

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DPG, Bonn, March 2010

# All infrastructures ready – Data taking 2010

