The GERDA Experiment at Gran Sasso

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on behalf of the GERDA Collaboration

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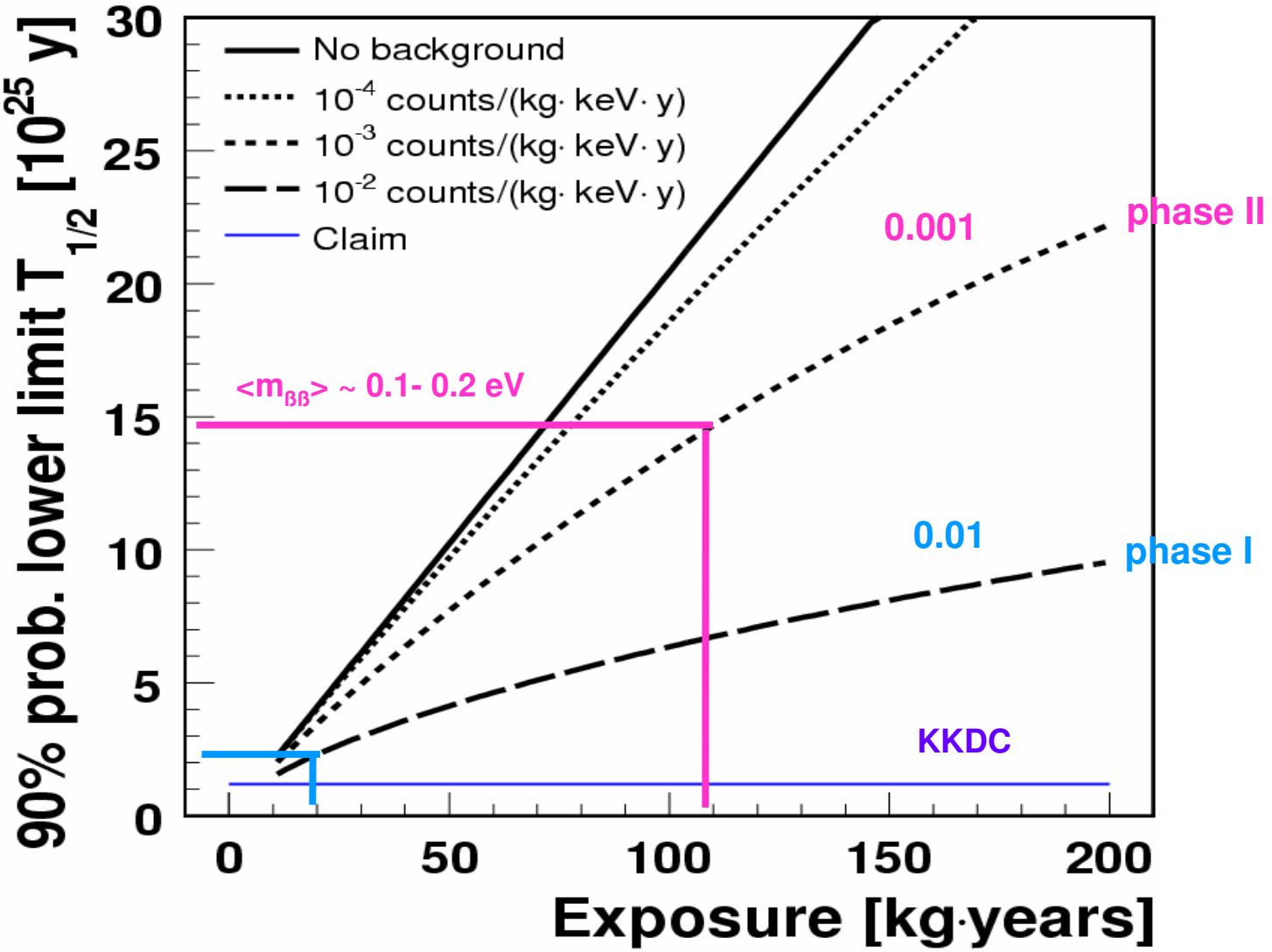
Outlook

- Goals of GERDA
- Design of the experiment
- Present status
- Future plans and conclusions

Goals of GERDA

- GERDA (GERmanium Detector Array) has been designed to investigate neutrino-less double beta decay of ^{76}Ge
  - Ge mono-crystals are very pure
  - Ge detectors have excellent energy resolution
  - Detector = source
  - Enrichment required (7.4 % → 86 %)
- Background level: 10^{-2} – 10^{-3} cts/(kg keV y)
- Realization in phases:
  - Phase I: 17.8 kg (8 diodes) of ^{76}Ge from HdM & IGEX experiments available
  - Phase II: adding new detectors (37.5 kg of enriched material in hand, two technologies pursued: n-type segmented or p-type BEGe detectors)
  - Phase III: world-wide collaboration, O(500 kg) of ^{76}Ge

Sensitivities



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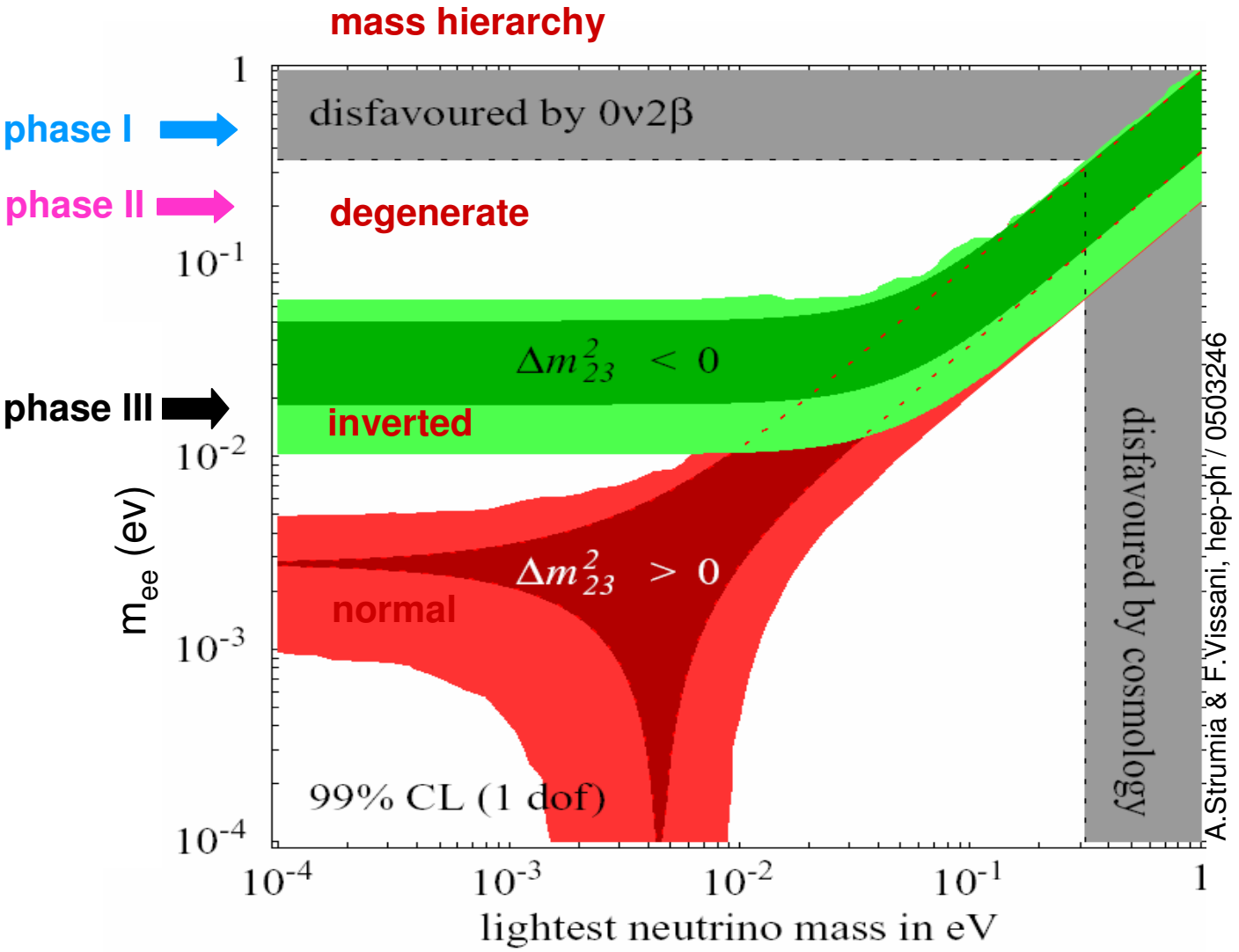
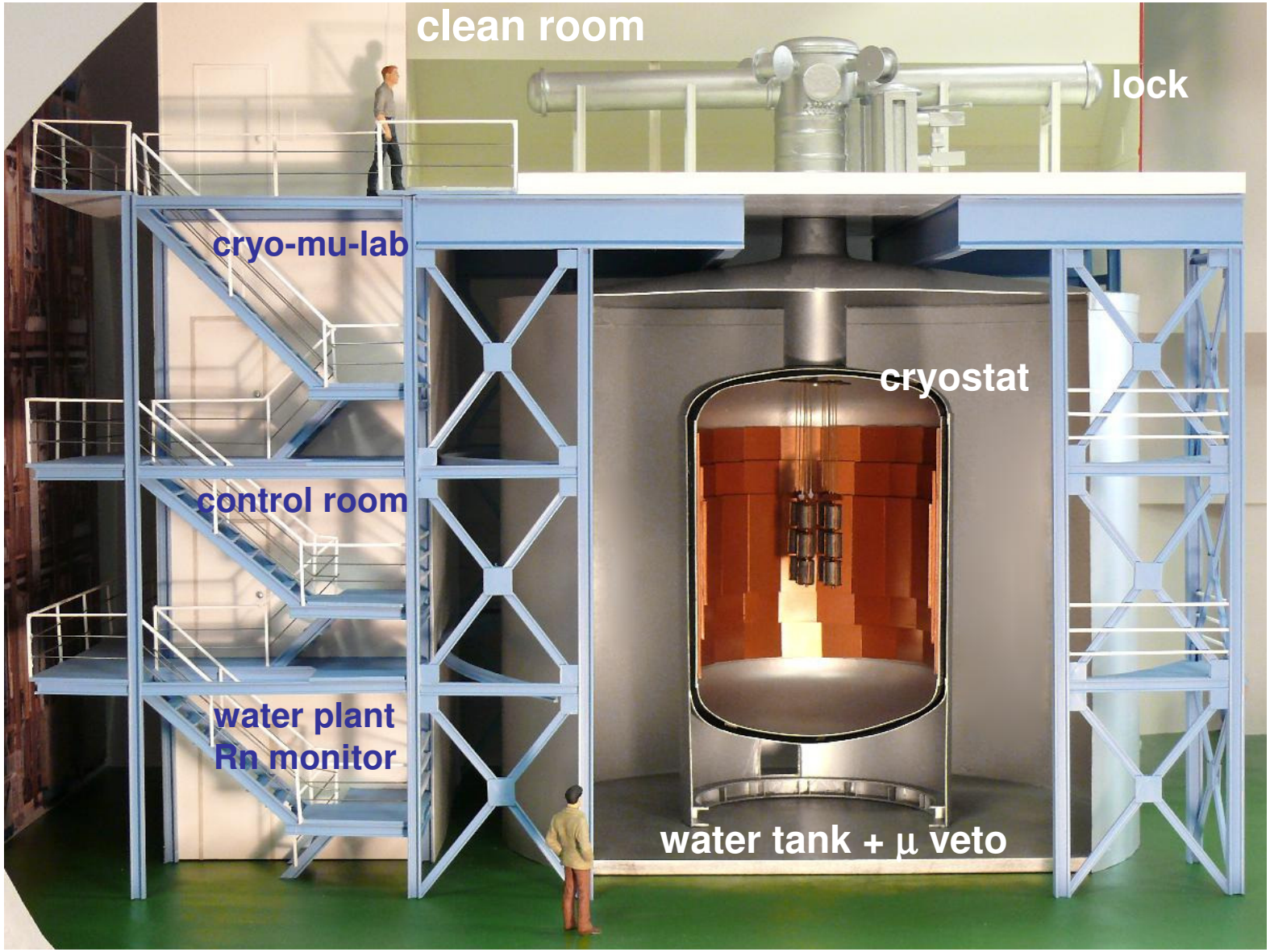


- GERDA's goals
- Deign
- Present status
- Conclusions

Design of the experiment



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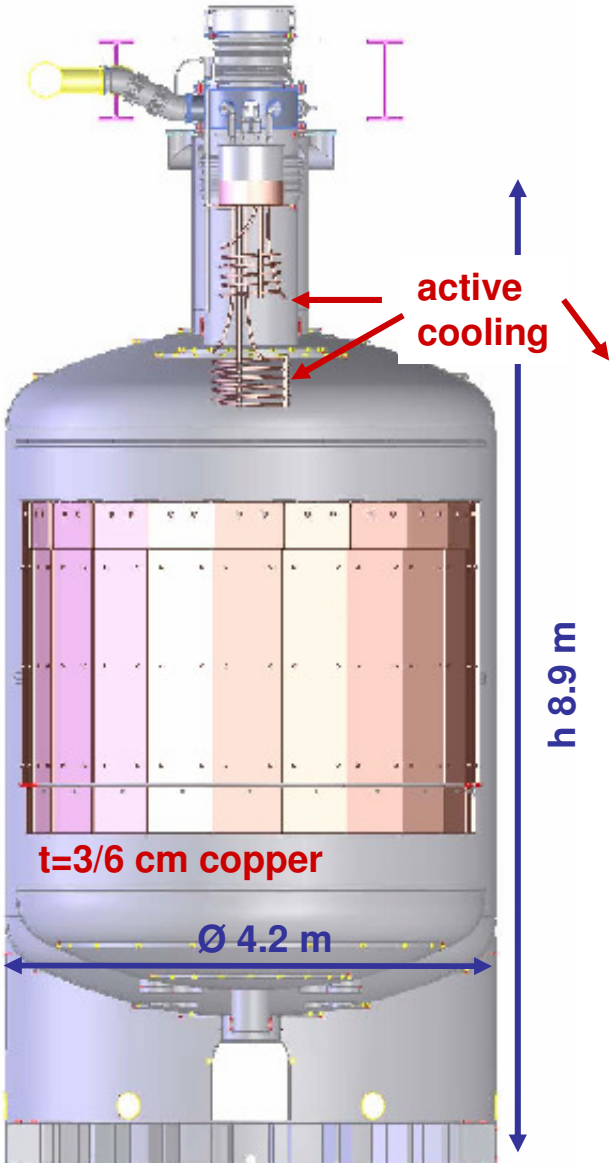
Cryostat



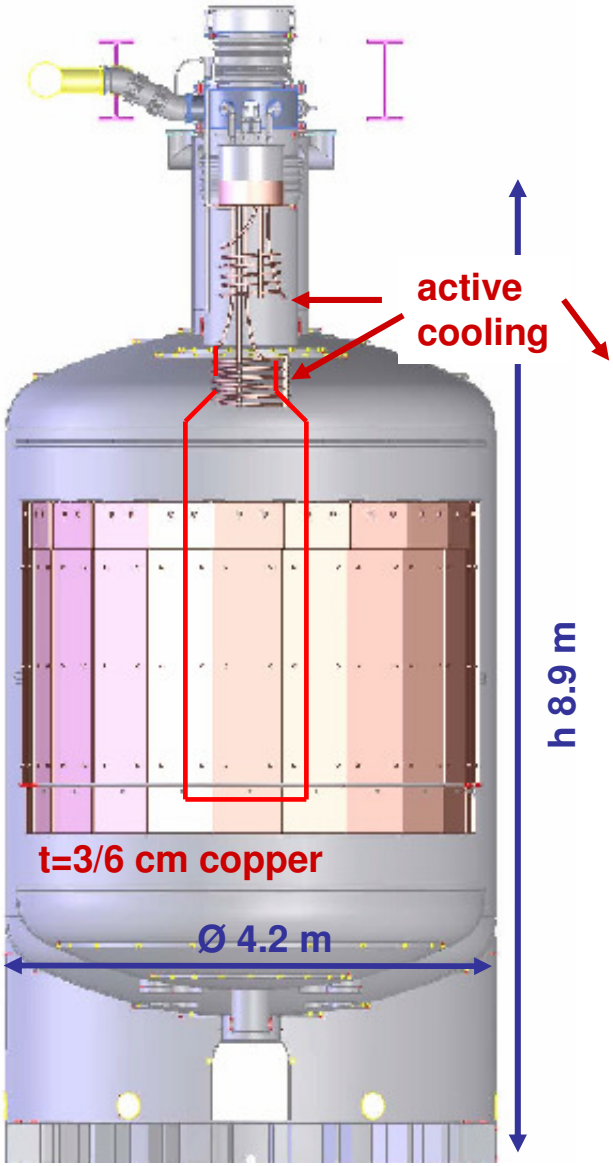
V = 65 m^3

Heat load: 200 W
Active cooling with LN

Internal copper shield

Detailed radio assay
- Construction materials
- ^{222}Rn emnation

Cryostat



$V = 65\ m^3$

Heat load: 200 W
Active cooling with LN

Internal copper shield

Detailed radio assay
- Construction materials
- ^{222}Rn emnation

Rn shroud of 30 µm copper
Ø 0.8m , 3m height
to prevent convective transport
of Rn from walls/copper to
Ge diodes

B ~ 1.5 10^{-4} cts / (keV·kg·y)

GERDA

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Unloading of cryostat

- GERDA's goals
- Deign
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Construction of water tank

Water tank:

Ø 10 m
h = 9.5 m
V = 650 m^3

Construction of clean room

- GERDA's goals
- Deign
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Muon veto in water tank

- GERDA's goals
- Deign
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Present status of the experiment

- GERDA construction completed in the LNGS Hall A
- Integration test of the Phase I detector string, FE electronics, active cooling, commissioning lock and Phase I DAQ successfully completed
- Filling with LAr completed
- All Phase I detectors (8 diodes, 17.8 kg) refurbished and ready
- Enriched/depleted material for phase II detectors in hand, tests of n-type segmented and p-type un-segmented BEGe detectors ongoing
- Low background test stand LArGe installed (investigation of new background reduction techniques)

Future plans and conclusions

- GERDA moving from construction phase to commissioning & operational mode
- Water filling to be started in Feb 2010
- Deployment of the first non-enriched detector string in Feb/March 2010, preparations for the enriched detectors deployment
- Down selection of the Phase II detectors in summer 2010, production in 2011

- Very close collaboration with the Majorana project (exchange information, development of MaGe)
- CERN Council: GERDA nominated as European Strategy Project

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GERDA collaboration excited to start-up

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