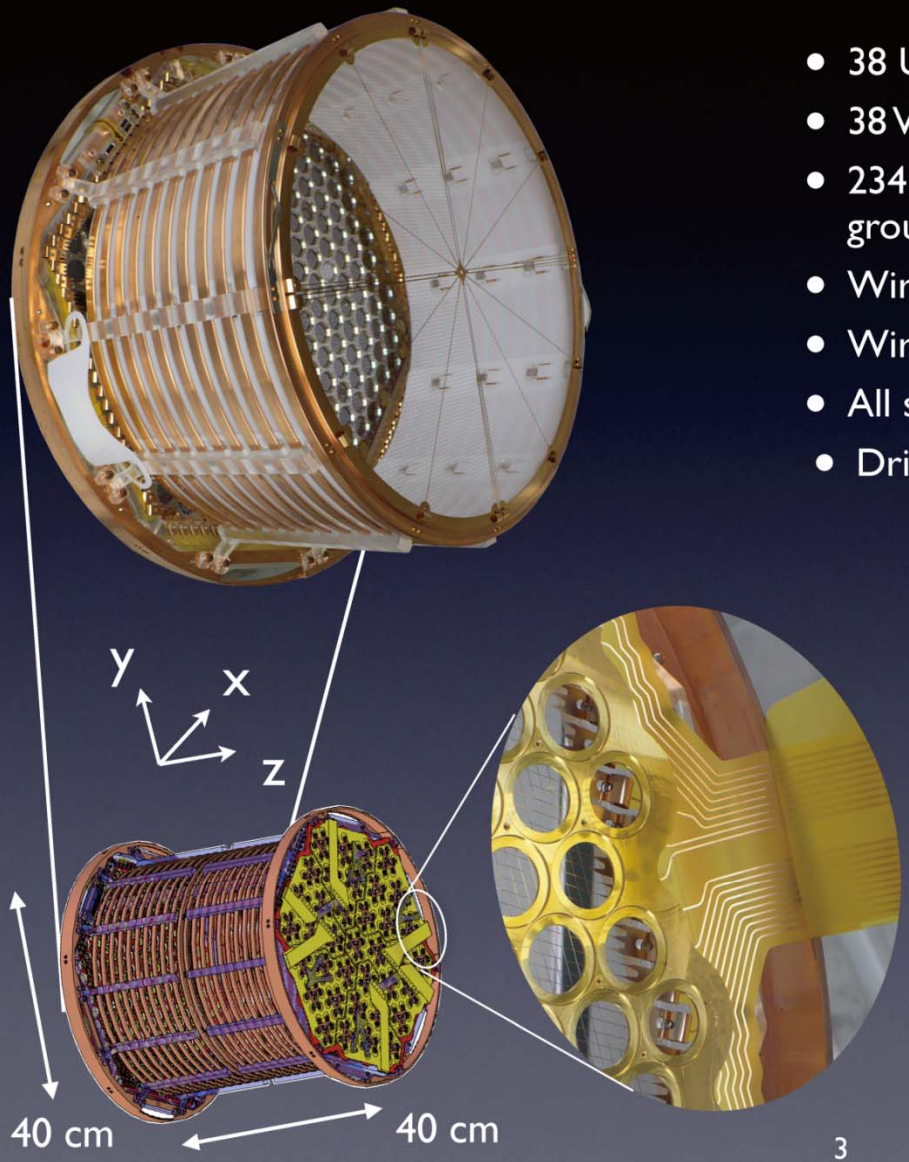
EXO-200 Results

Jacques Farine, Laurentian University
For the EXO collaboration

Neutrino-12 Kyoto 6 June 2012

The EXO-200 TPC



Two almost identical halves reading ionization and 178 nm scintillation, each with:

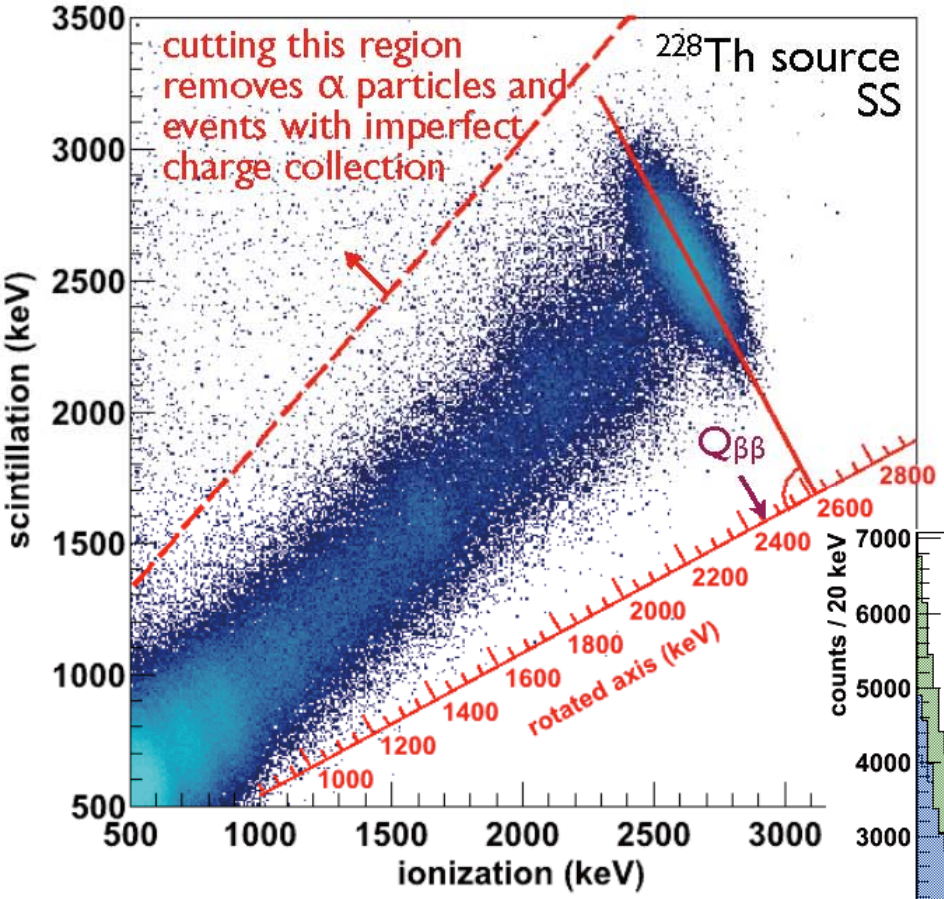
- 38 U triplet wire channels (charge)
- 38 V triplet wire channels, crossed at 60° (induction)
- 234 large area avalanche photodiodes (APDs, light in groups of 7)
- Wire pitch 3 mm (9 mm per channel)
- Wire planes 6 mm apart and 6 mm from APD plane
- All signals digitized at 1 MS/s, ±1024S around trigger
- Drift field 376 V/cm

- Field shaping rings: copper
- Supports: acrylic
- Light reflectors/diffusers: Teflon
- APD support plane: copper; Au (Al) coated for contact (light reflection)
- Central cathode, U+V wires: photo-etched phosphor bronze
- Flex cables for bias/readout: copper on kapton, no glue

Comprehensive material screening program

Goal: 40 cnts/2y in $0\nu\beta\beta$ $\pm 2\sigma$ ROI, 140 kg LXe

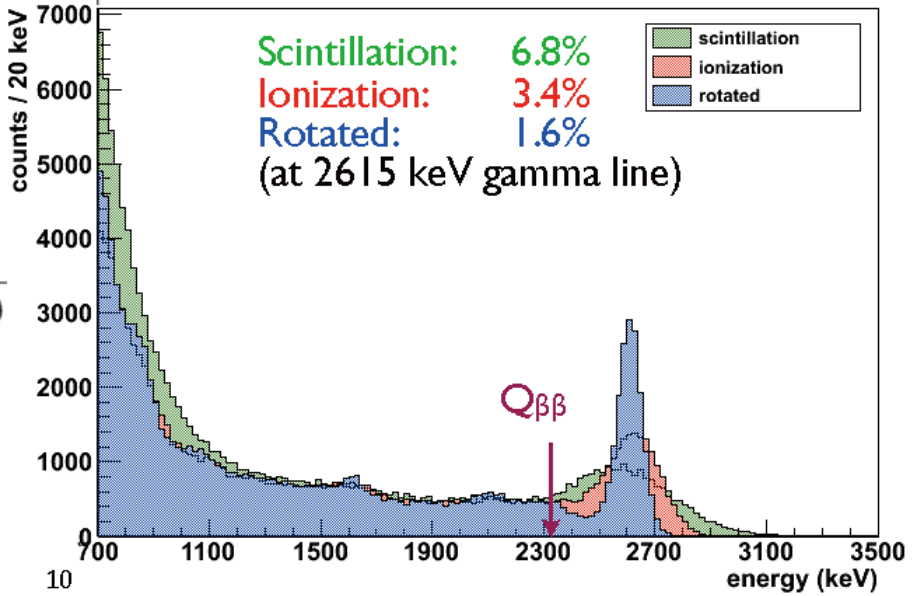
Combining Ionization and Scintillation



Properties of xenon cause increased scintillation to be associated with decreased ionization (and vice-versa)

E. Conti et al. Phys. Rev. B 68 (2003) 054201

Use projection onto a rotated axis to determine event energy



Rotation angle chosen to optimize energy resolution at 2615 keV

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Results from GERDA

Kyoto June 6, 2012

Peter Grabmayr
Eberhard Karls Universität Tübingen, Germany

for the GERDA Collaboration

the search for the 0νββ decay in ^{76}Ge

concept: diodes enriched in ^{76}Ge on strings in liquid argon (Lar) @ LNGS

we learn from the summed electron spectrum:

- ^{76}Ge — active mass, $T_{1/2}^{2\nu}$
- LAr: ^{39}Ar and ^{42}Ar (^{42}K)
- background: γ, α, μ, n
- systematics: linearity, stability (calibrations)

blinding 2019 – 2059 keV

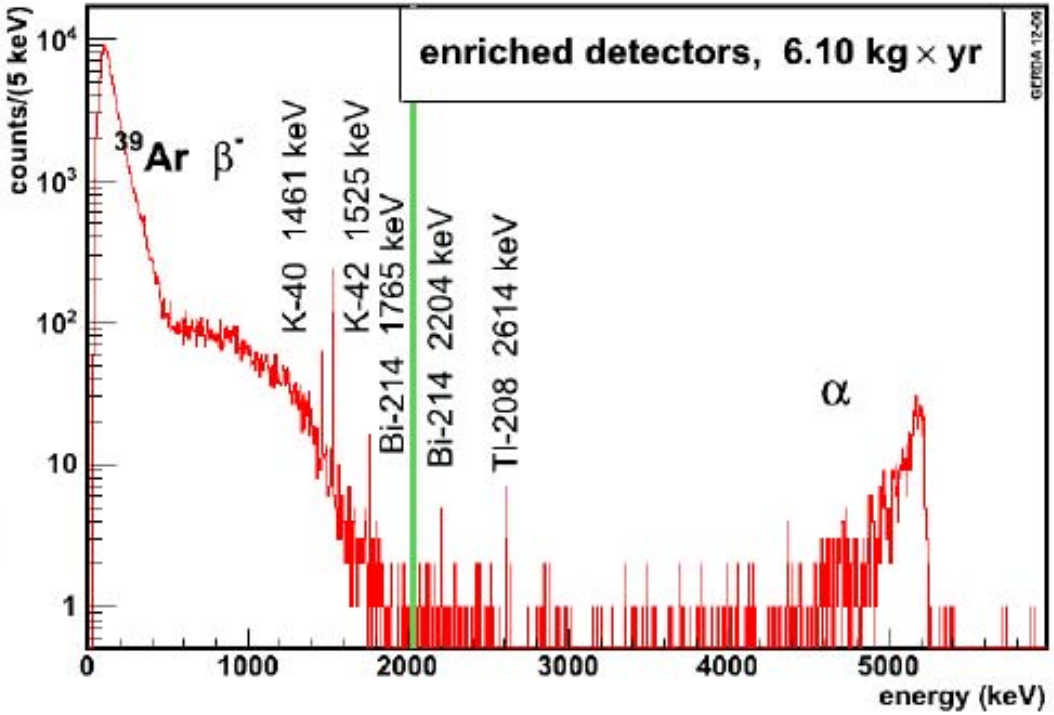
statistics: enriched 6.10 kg yr

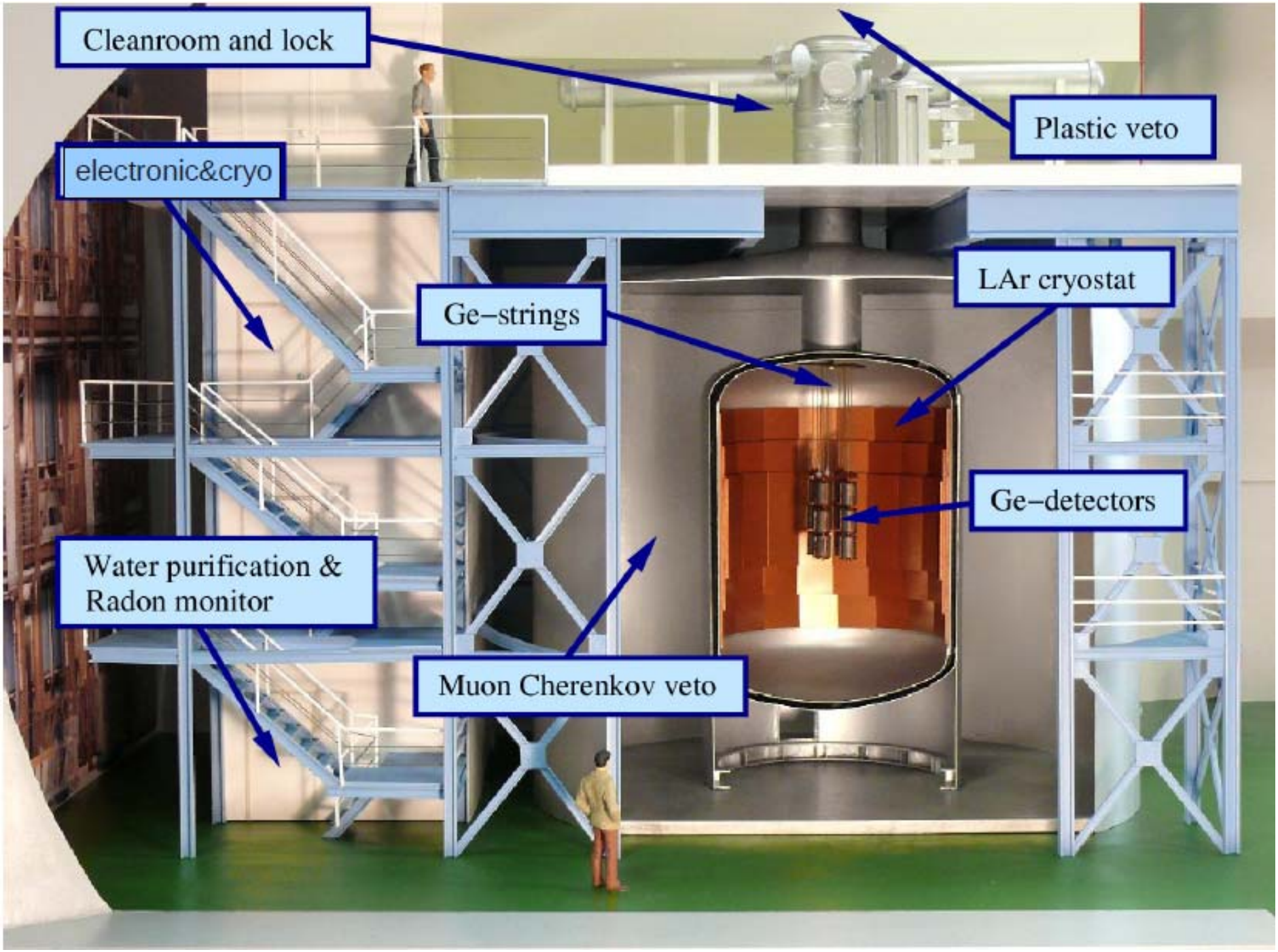
1.11.2011 – 21.5.2012

establish analysis procedures to be employed on 0νββ data after unblinding

outline:

1) Phase I
2) Phase II (starting early 2013)

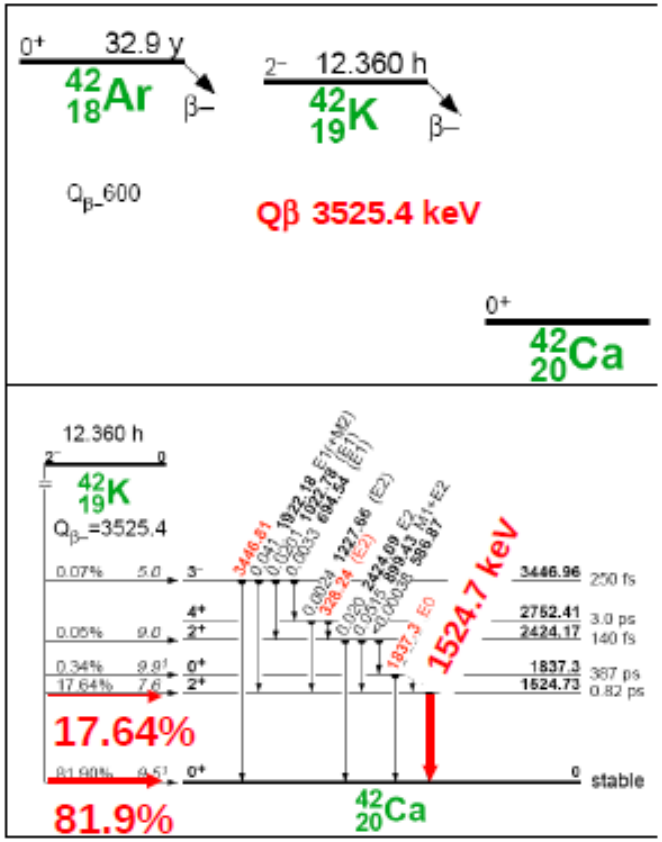


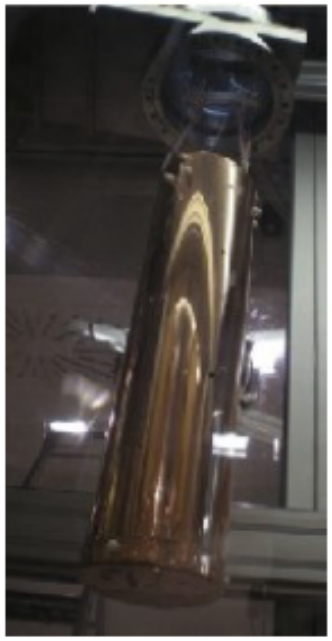

Cleanroom and lock
Plastic veto
electronic&cryo
LAr cryostat
Ge–strings
Ge–detectors
Water purification &
Radon monitor
Muon Cherenkov veto

reason for mini-shroud: ^{42}K, resp. ^{42}Ar

Barabash: ^{42}Ar < 3*10^{-21} g/g ; used for proposal
< 41 µBq/kg 90% CL

however: collection of ions through E-field from HV





thickness:
60 µm Cu