



-Dark Matter Search -

CEA-Saclay DAPNIA and DRECAM

CRTBT Grenoble

CSNSM Orsay

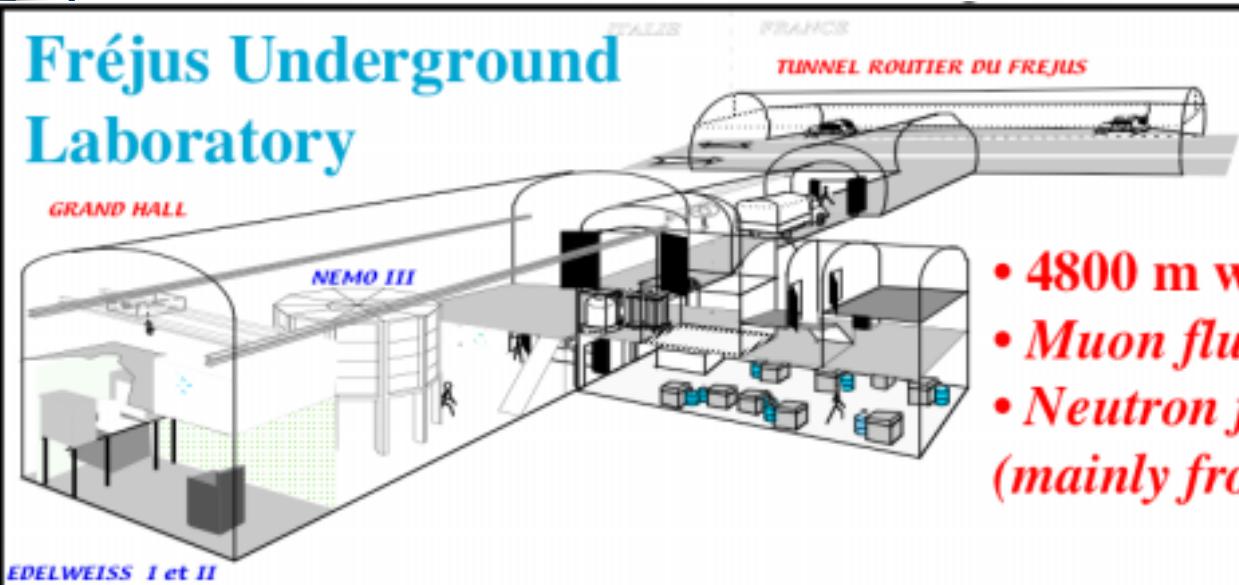
IAP Paris

IPN Lyon

Modane Underground Laboratory (Fréjus)

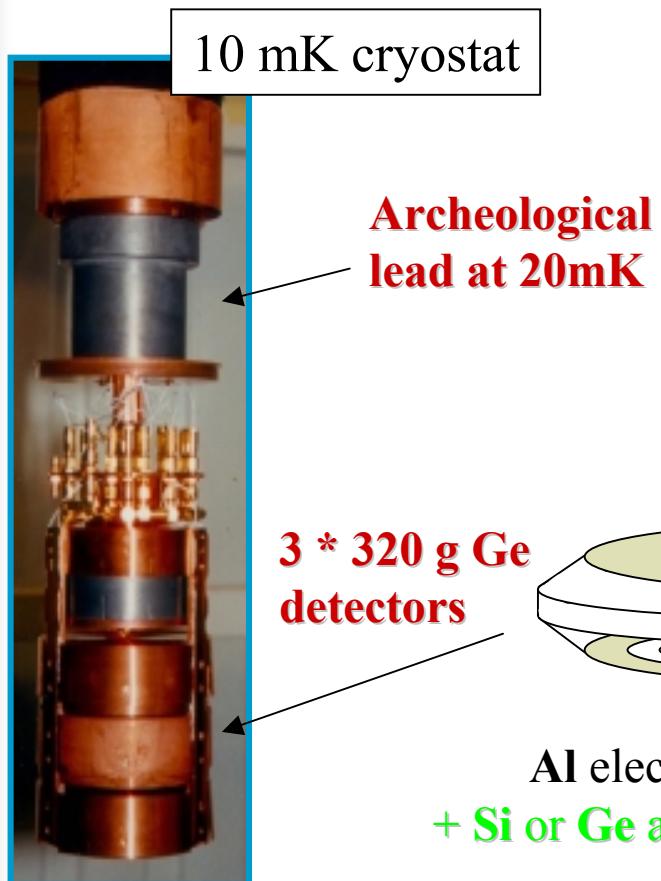
FZ-Karlsruhe and Univ. Karlsruhe

Fréjus Underground Laboratory

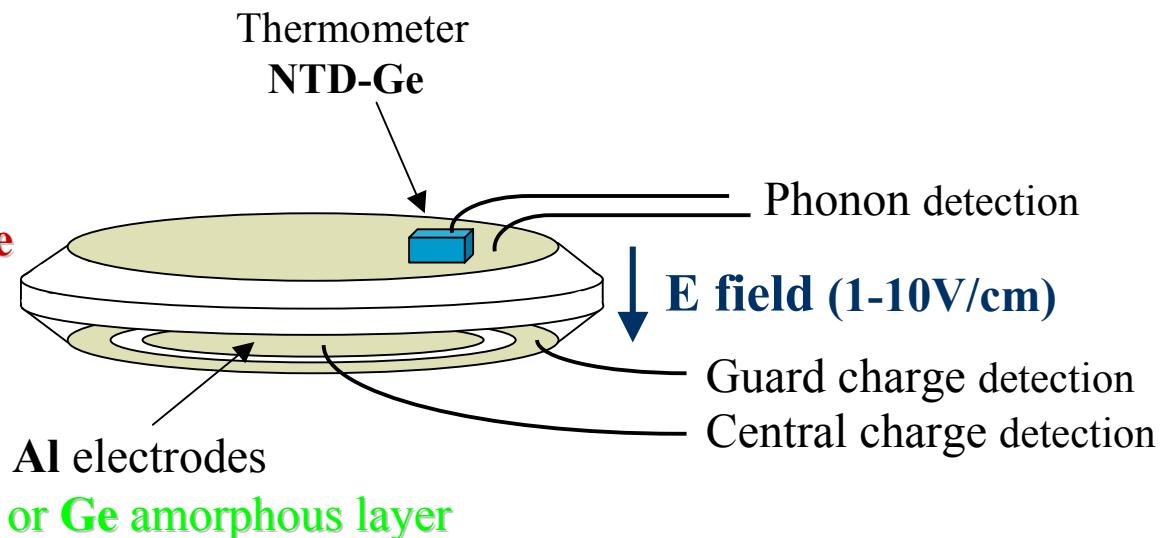


- 4800 m water eq.
- Muon flux $\approx 4 \text{ muons}/\text{m}^2/\text{day}$
- Neutron flux $\approx 1.5 \cdot 10^{-6} \text{ s}^{-1} \text{ cm}^{-2}$
(mainly from rock radioactivity)

Edelweiss-I: “1 kg” stage



Simultaneous measurement of charge and heat signals for each interaction.



1st data taking : Fall 2000

GeAl9 detector

2nd data taking : First semester 2002 **GGA1,GeAl9,GeAl10**

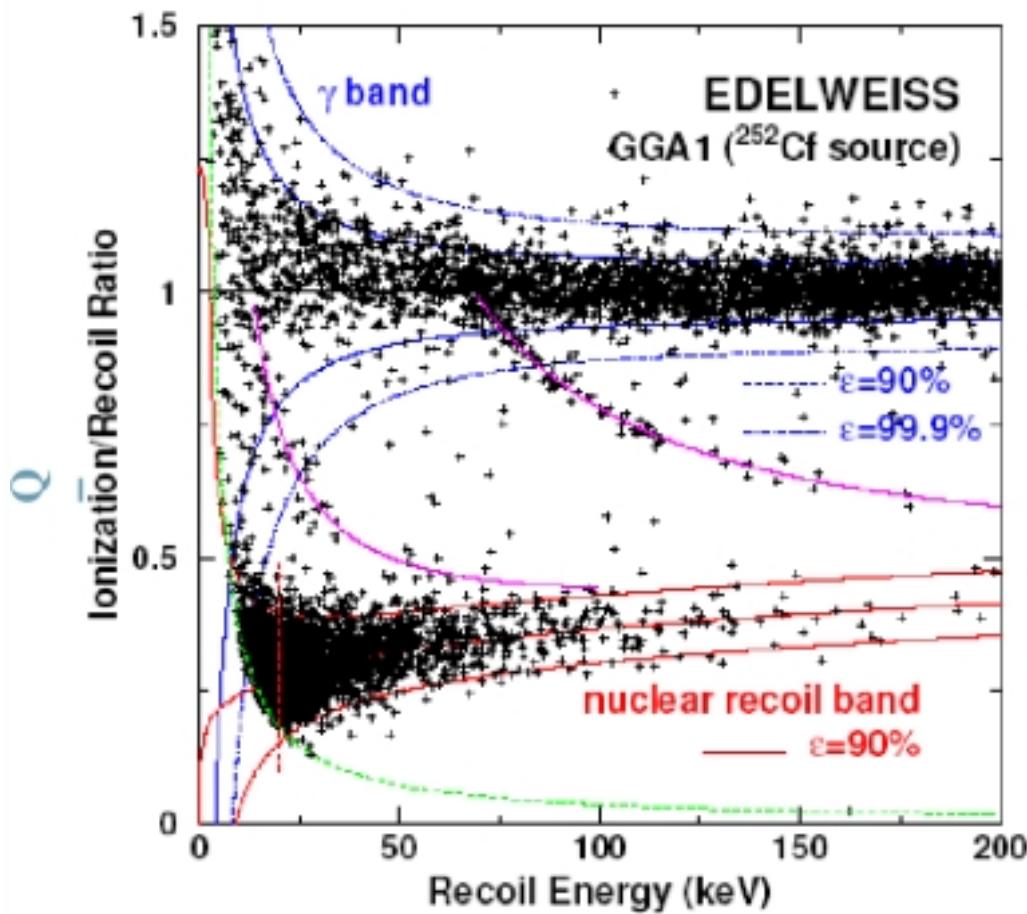
3rd data taking : October 2002 - March 2003 **GGA3, GSA1, GSA3**

Event-by-event discrimination down to threshold energy

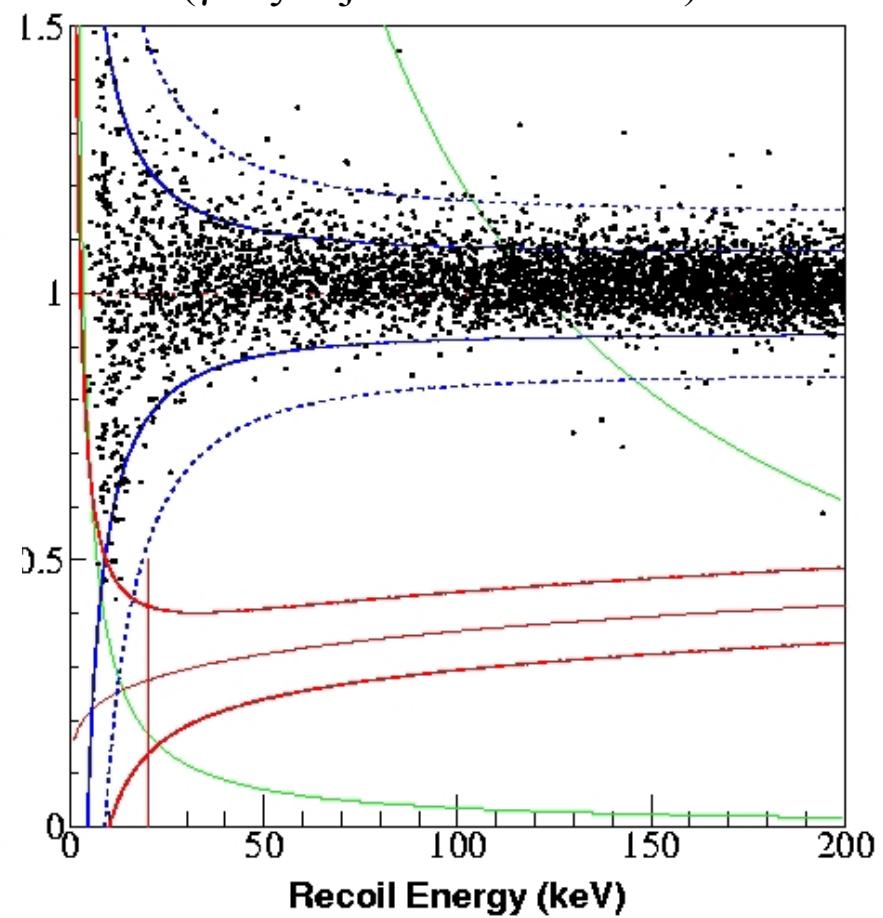


Different charge/heat ratio for nuclear recoils and electronic recoils

Neutron calibration



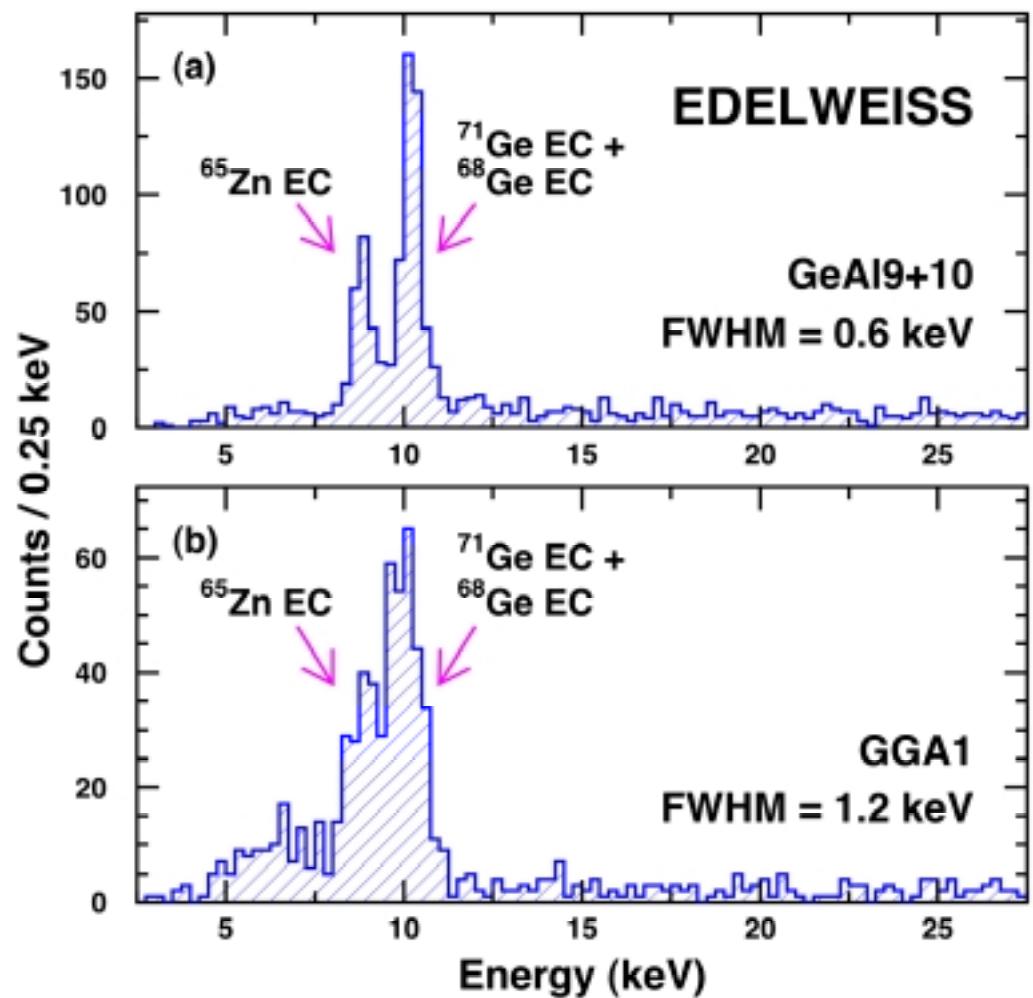
γ calibration (^{137}Cs source)
(γ -ray rejection $\approx 99.99 \%$)



Present 320g EDELWEISS detectors. excellent energy resolution



- Phonon channels:
Sub-keV energy resolution
(300 eV FWHM on GGA3)
- Charge channels:
 ≈ 1 keV FWHM
- **Background comprehension down to a few keV e.e.**

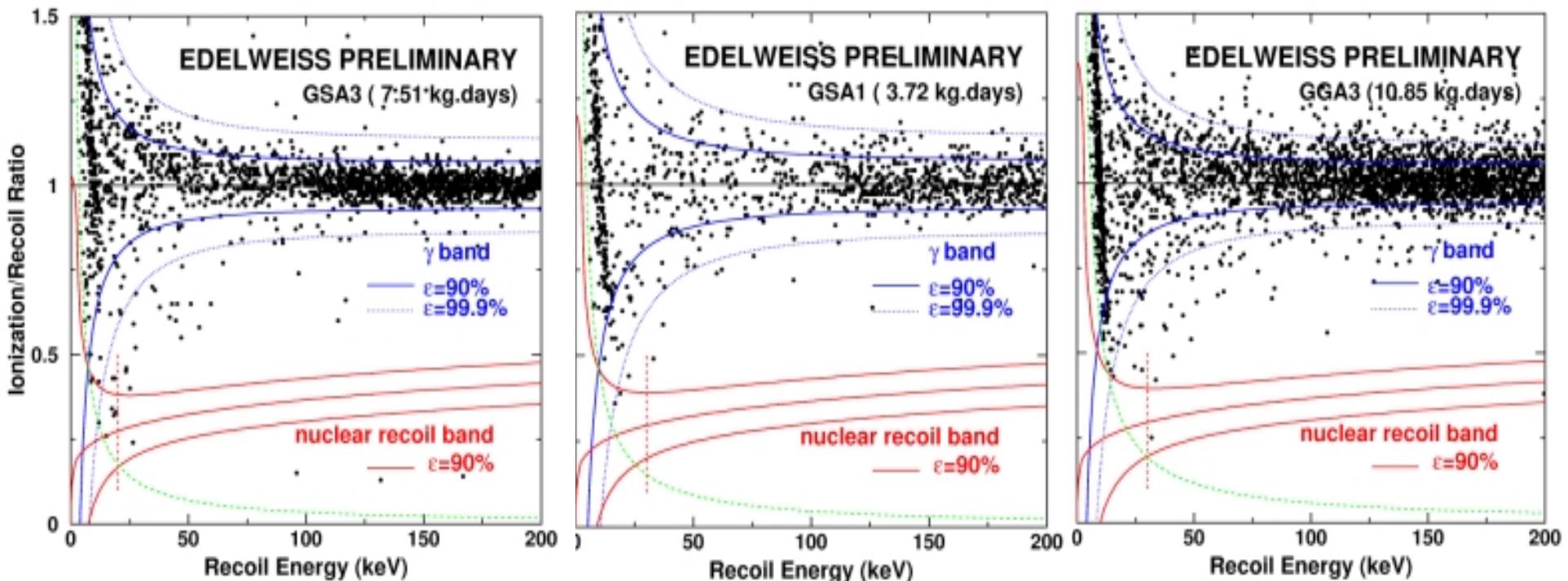


EDELWEISS 2003 data.

Additional $20 \text{ kg} \times \text{day}$ fiducial exposure using 3 bolometers

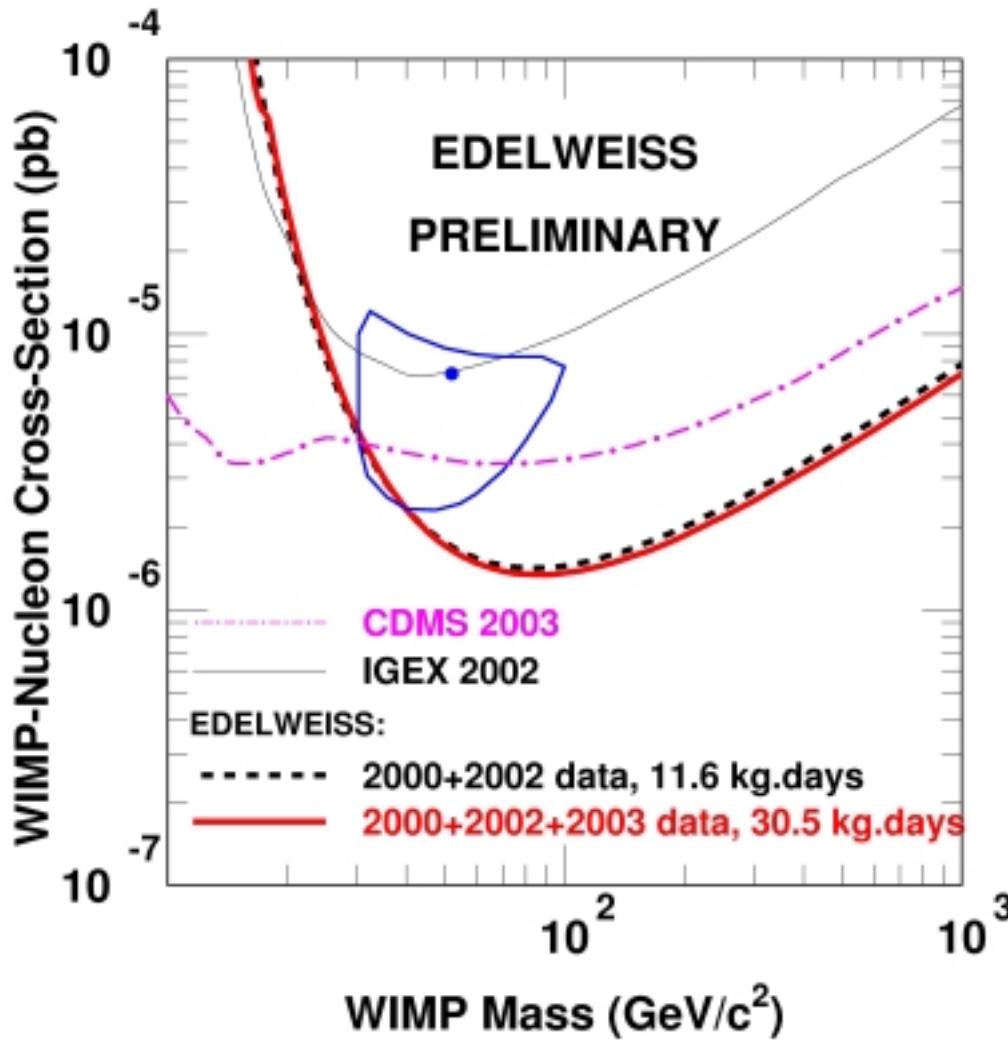


Run started after extended γ -ray detector exposure



Present 2000-2003 exposure: $13.8 \text{ kg} \times \text{day}$ @ $E_{\text{recoil}} > 20 \text{ keV}$
 $30.5 \text{ kg} \times \text{day}$ @ $E_{\text{recoil}} > 30 \text{ keV}$

EDELWEISS exclusion limit



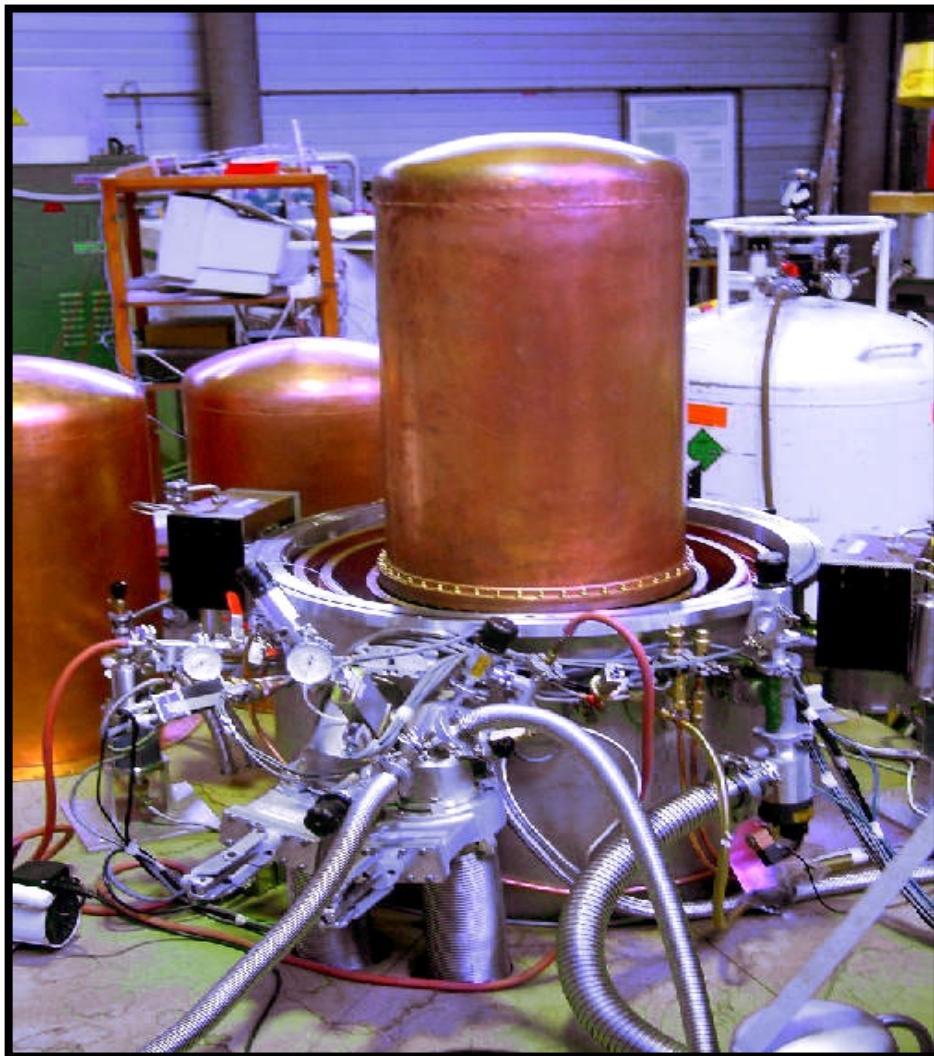
- No background subtraction
- Excludes DAMA best fit at $> 99.8\%$ C.L.
exclusion is model independent
Copi and Krauss
(Phys.Rev. D67 (2003) 103507)

Edelweiss-I ≈ 0.15 event/kg/day at $E_{\text{recoil}} > 20$ keV



EDELWEISS : what's next ?

- New run started: improved energy threshold with
≈100% detection efficiency at 10 keV recoil energy
(i.e. ≈ 2.5 keV electron equivalent)
- Expect further factor > 2 in exposure with improved sensitivity, particularly at low WIMP mass
- November 2003: end EDELWEISS-I run and
install 1st stage of EDELWEISS-II with
 21×320 g Ge-NTD detectors
7 thin film 400 g Ge detectors



*New 100-litter dilution cryostat :
8-10 mK obtained during several runs
Wiring and cold electronic test : end 2003*

EDELWEISS-II detector setup

(Phase 28*320g detectors approved)

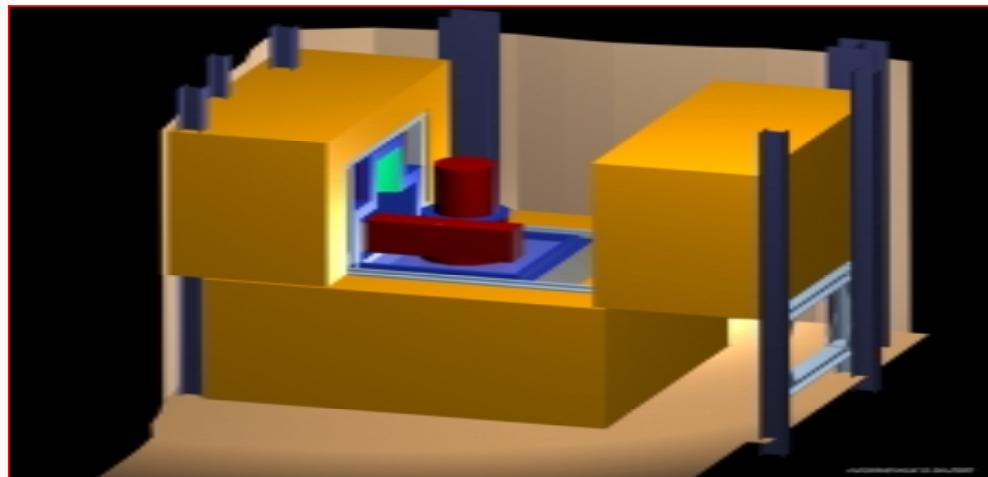
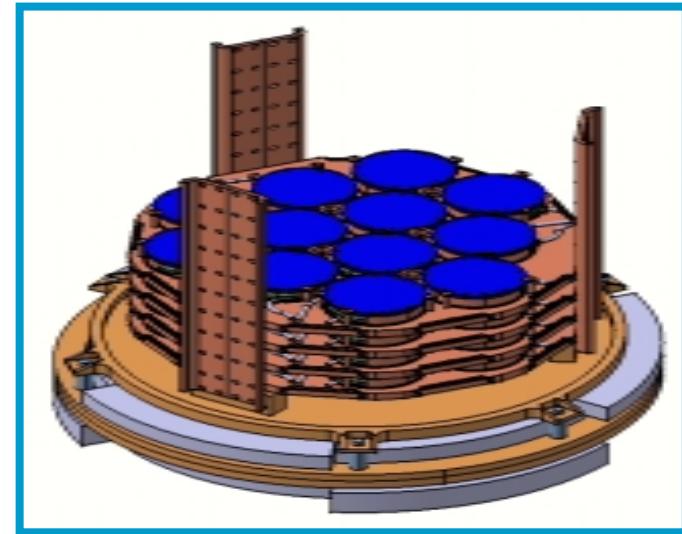


**100 liter cryostat for up to
120 detectors : $\approx 36 \text{ kg Ge}$**

**Development of NbSi thin film sensors
to eliminate surface events**

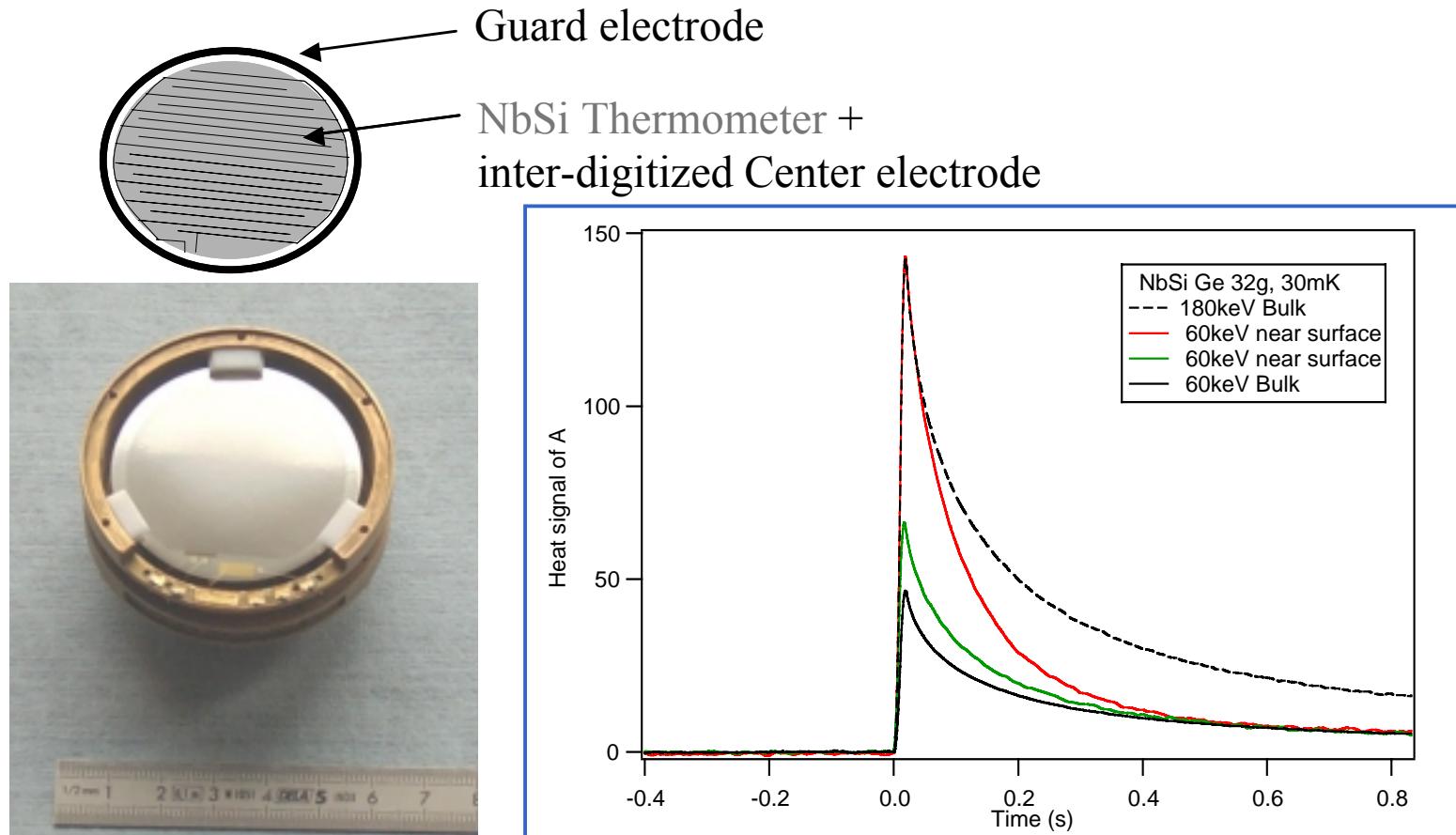
Pulse-shape analysis of charge signal

Improve background by factor ≈ 100



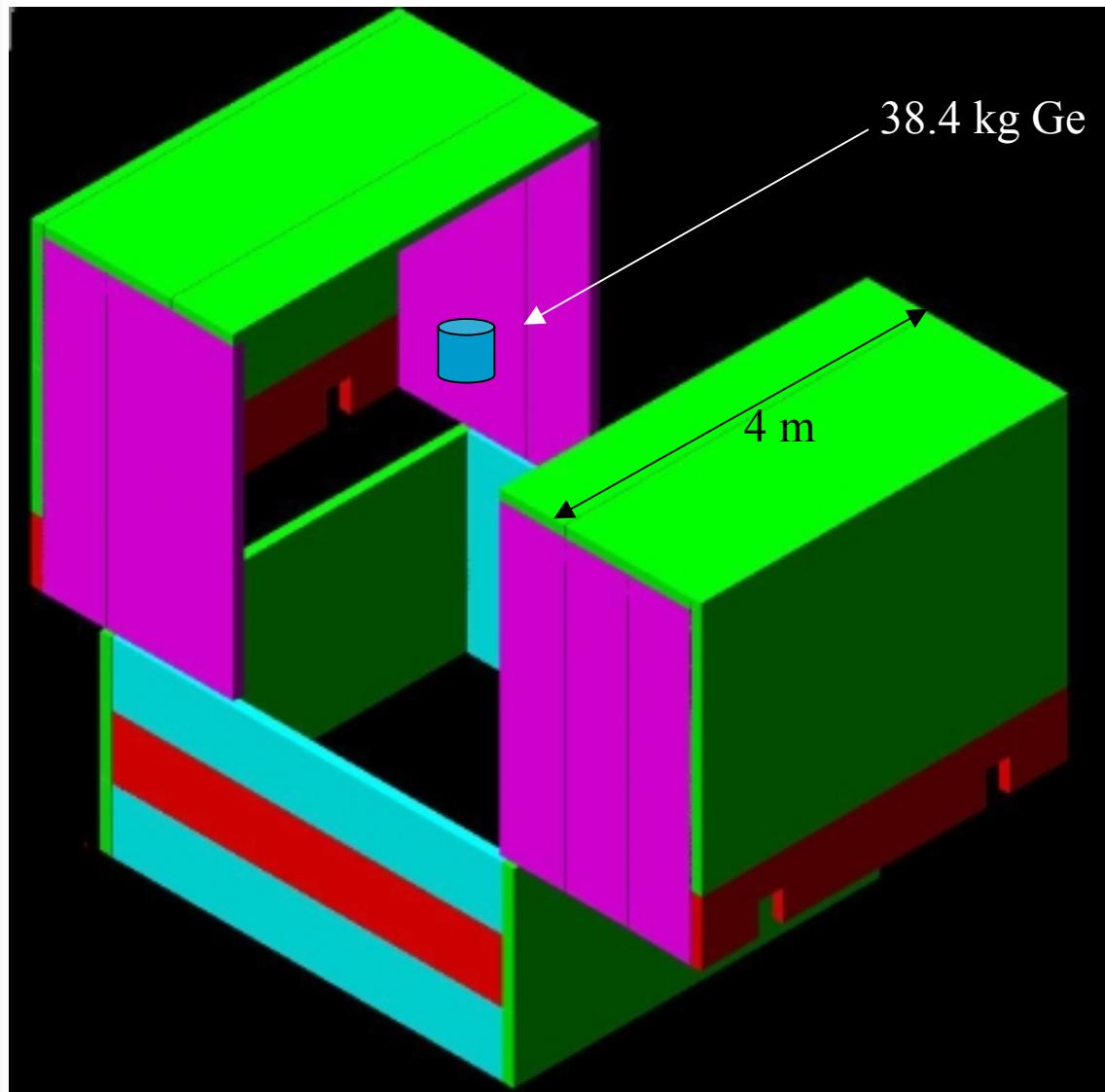
NbSi Anderson insulator thin film sensors

Heat pulse shape analysis for near surface events rejection



3 x 200g bolometers will be tested in EDELWEISS-I
7 x 400g project for EDELWEISS-II

EDELWEISS II μ Veto



- Karlsruhe/KARMEN group joins EDELWEISS
- $VETO = 140 \text{ m}^2$ plastic scintillator

Experimental status and theoretical predictions

