Status of Muon Veto

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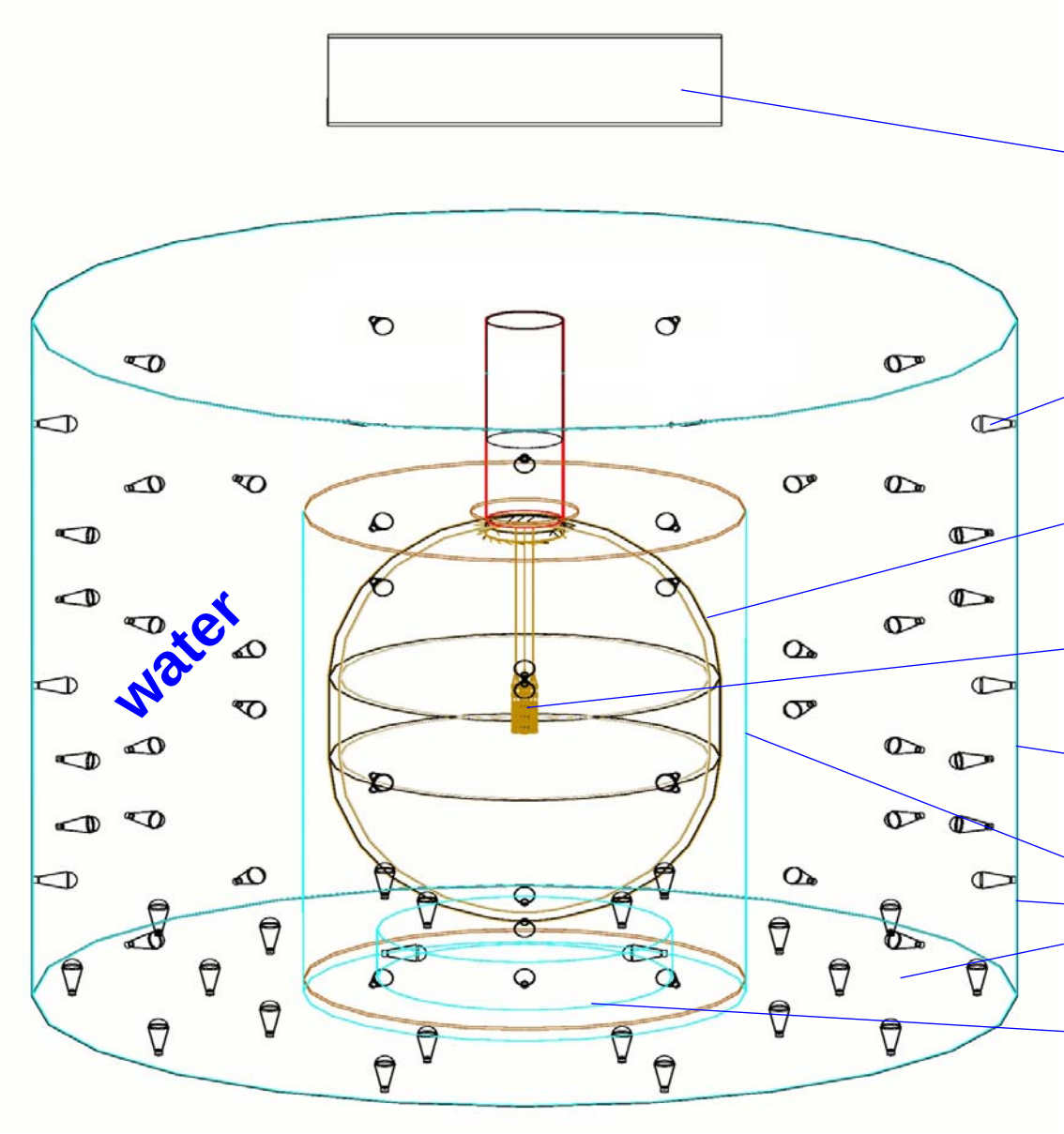
Muon Detector - Overview



plastic scintillator

photomultiplier

cryo tank (+3.wall)
-old design-

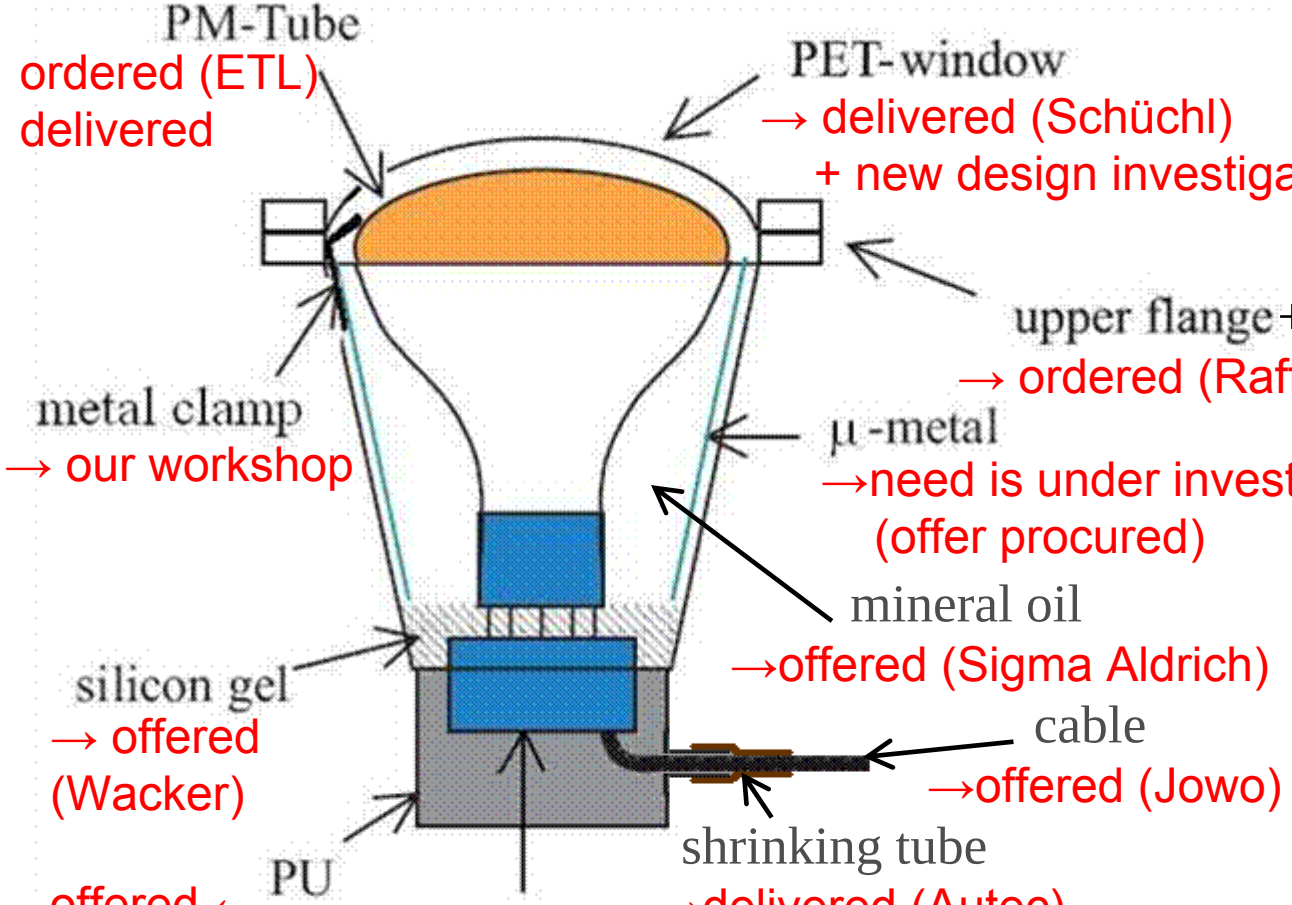
Ge crystals

water tank

reflector VM2000

‚lower pillbox‘

PMT - Encapsulation Design & Status



Master Bond
→ delivered

VM 2000 foil
→ offered with adhesive

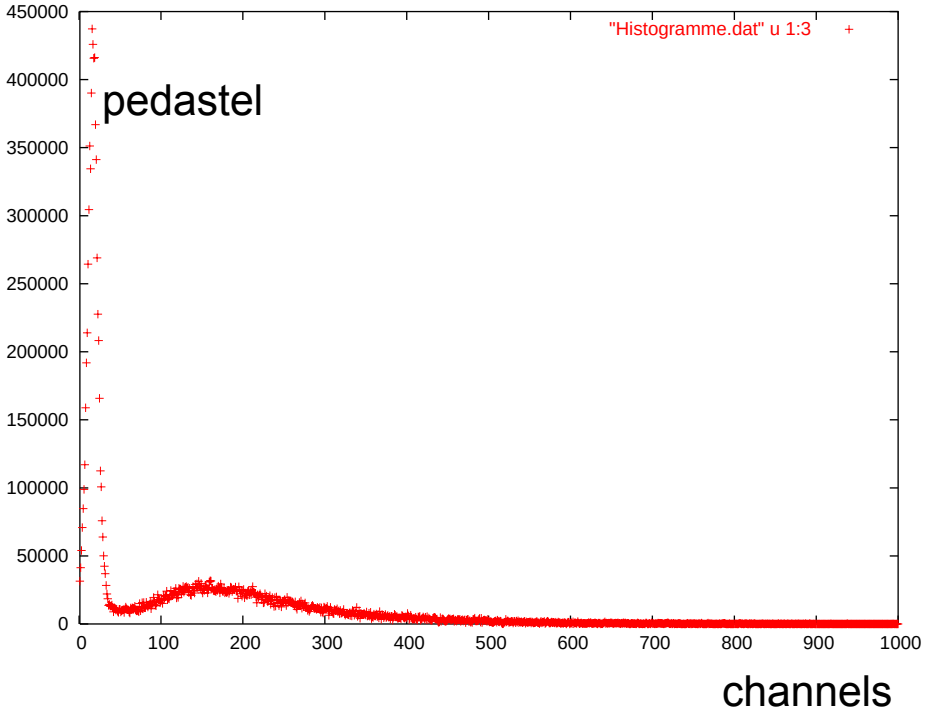
Plastic scint. panels
→ constr. from Sep.06
(Dubna)

PMT Testing

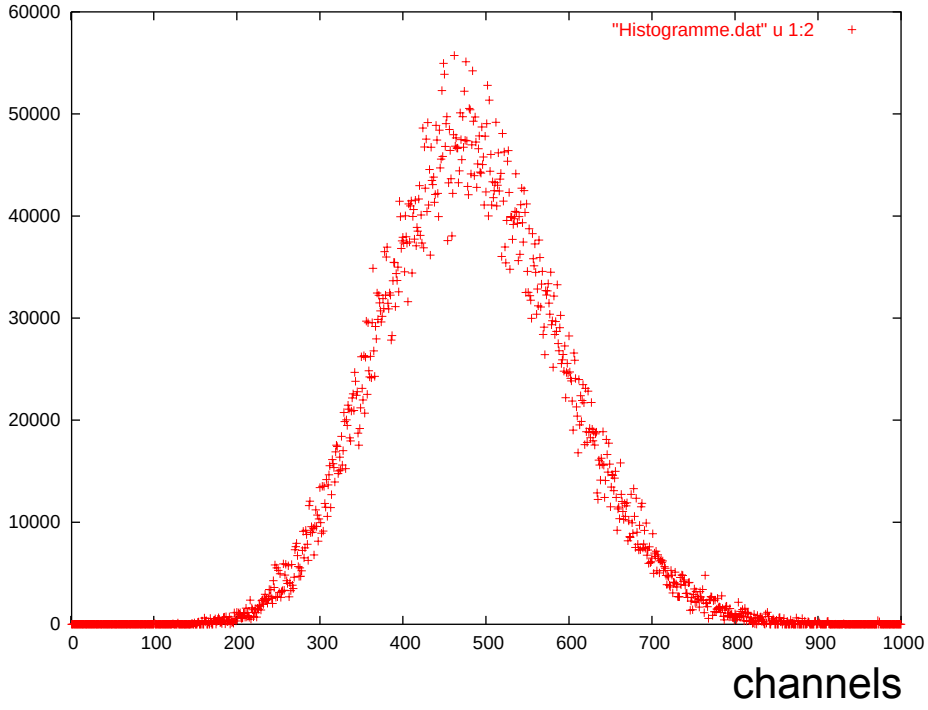
- Identification of high dark rate PMTs
  - most specified to 1-2 kHz
  - 10 of 100 specified with 7-10 kHZ
    but only one really at ~9 kHz
    the others at 1-2 kHz
  - some low noise ~0.4 kHz
- Investigation of linearity (with 2 LEDs)
  $\rightarrow$ linear up to 60 p.e.
- Earth magnetic field influence
    with and without mu-metal

PMT Testing

Single p.e. peak



Multi p.e. peak



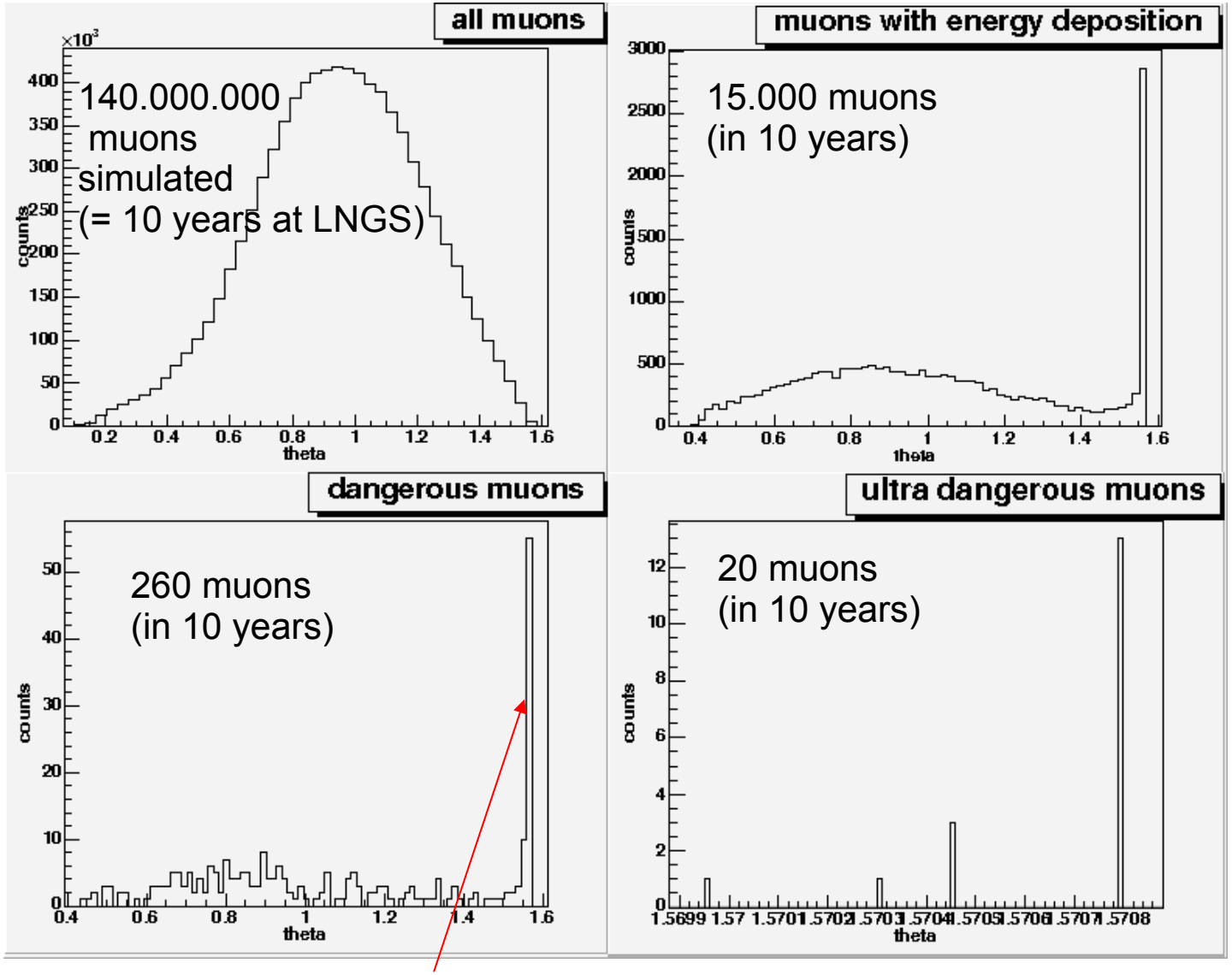
PMT Testing – Mu-metal

	with mu-metal		without mu-metal	
PMT orientation	1 p.e. [ch. – ped.]	multi(25-30)p.e. [ch. – ped.]	1 p.e. [ch. – ped.]	multi(25-30)p.e. [ch. – ped.]
NE	130	441	272	
E	127	446	270	
SE	142	472	280	
S	139	476	280	
SW	150	476	292	
W	150	476	286	
NW	146	461	277	
N	135	456	263	
vertical	131	404 (!)	225 (!)	
peak/valley	2.5 – 3	n.a.	2 – 2.5	
N-S variation	~16%	~8%	~10%	
Vert.-Hor. var.	~14%	~16%	~24%	

further testing

→ thanks to Bayarto Lubsandorzhiev (INR Moscow)

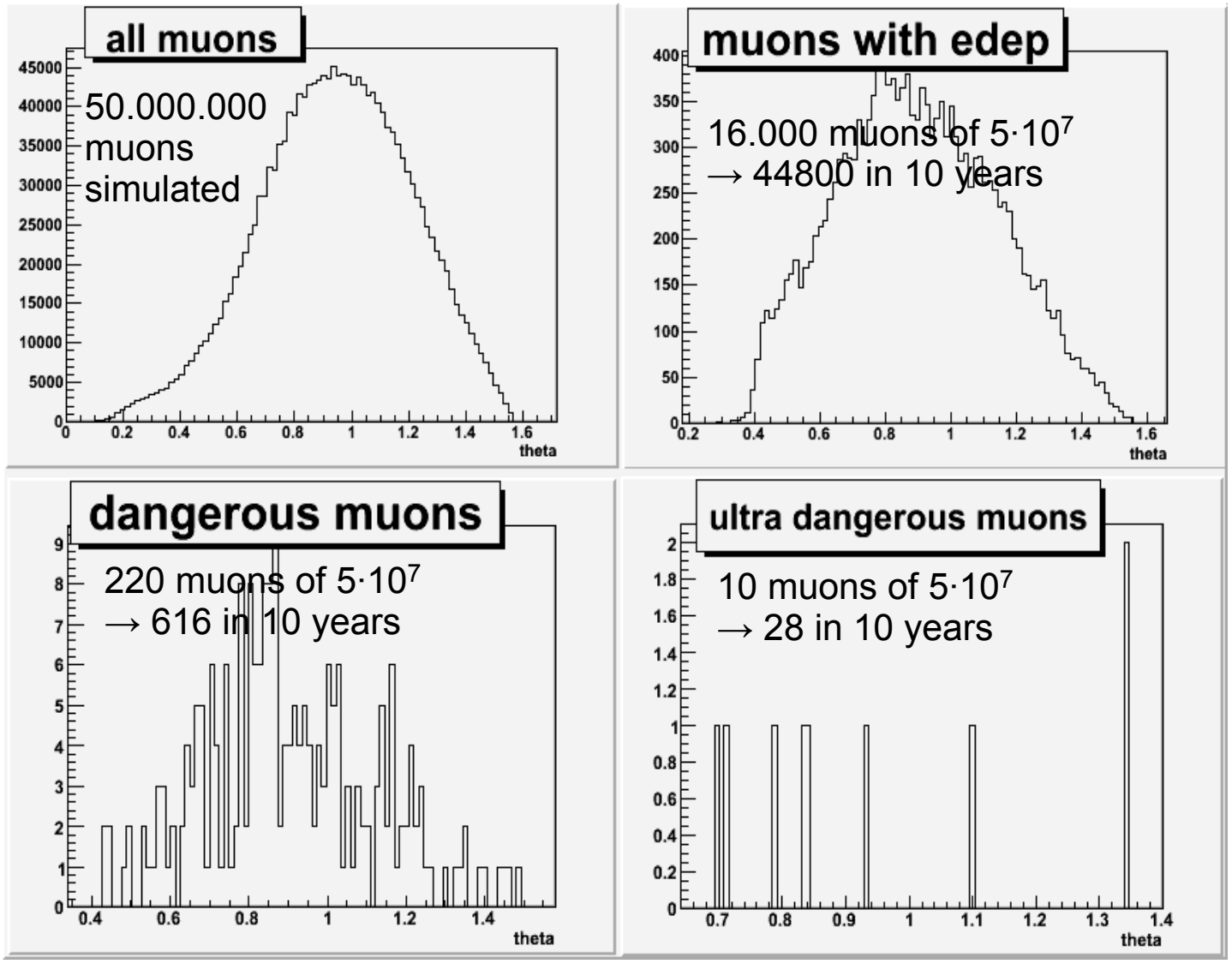
Simulations – Old muon distributions



Two corrections necessary: ‚strange' peak and updated detector geometry (MaGe)

→ Markus Knapp (Univ. Tübingen)

Simulations – New muon distributions



→ Markus Knapp (Univ. Tübingen)

Muon Simulations – Summary

	old MaGe (det. geometry) old Root	old MaGe (det. geometry) new Root	new MaGe (det. geometry) new Root
all muons (in 10y)	$1.4 \cdot 10^8$	$1.4 \cdot 10^8$	$1.4 \cdot 10^8$
muons with E_{dep}	15000	15000	44800
dangerous	260	260	616
ultra-dangerous	20	20	28
muon angular distribution	strange peak	okay	okay

→ $\sim 2 \cdot 10^{-3}$ (kg keV y)$^{-1}$ of dangerous ext. muons

with 95% veto:
→ $\sim 10^{-4}$ (kg keV y)$^{-1}$

with anti-coincidence of Ge detectors:
→ $\sim 10^{-5}$ (kg keV y)$^{-1}$

Muon Veto – Schedule

- Summer/Autumn: Test of all PMTs + electronics
- Autumn 2006: Encapsulation of PMTs
  Tightness tests with PMTs
- Winter: Welding of attachment points in steel tank, for PMTs and VM2000 (prior to steel tank test)
- Spring 2007: PMTs and VM2000 installation +
  + Electronics set-up and test (≈2 months)