# The Muon Veto @ GERDA

GERDA Collaboration

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# Muon veto

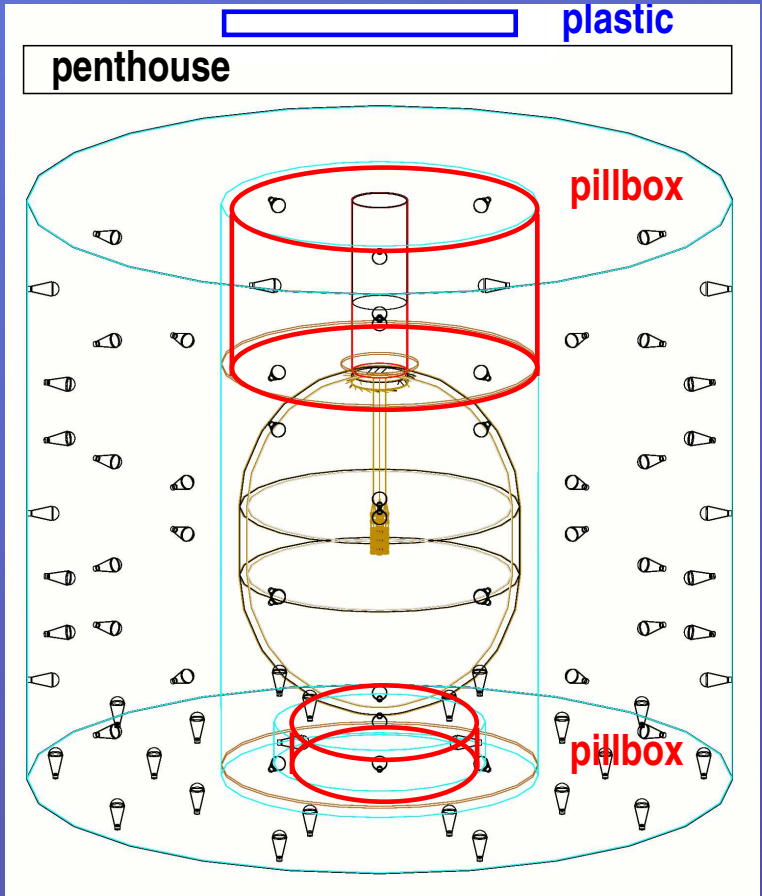
Components:

- *water in tank(s) + scintillator*
- *3rd wall + reflector (VM2000)*
- *photomultiplier ETL 8”  9350KB*
- *encapsulation*
- *cables, flange, splitter*
- *electronics, DAQ*

Time table

# The setup

flux at LNGS: 1,1 $\mu$/h/m$^2$ $\rightarrow$ 100 $\mu$/h
1,4·10$^8$ $\mu$ simulated $\equiv 1,4 \cdot 10^6$ h = 160 yr



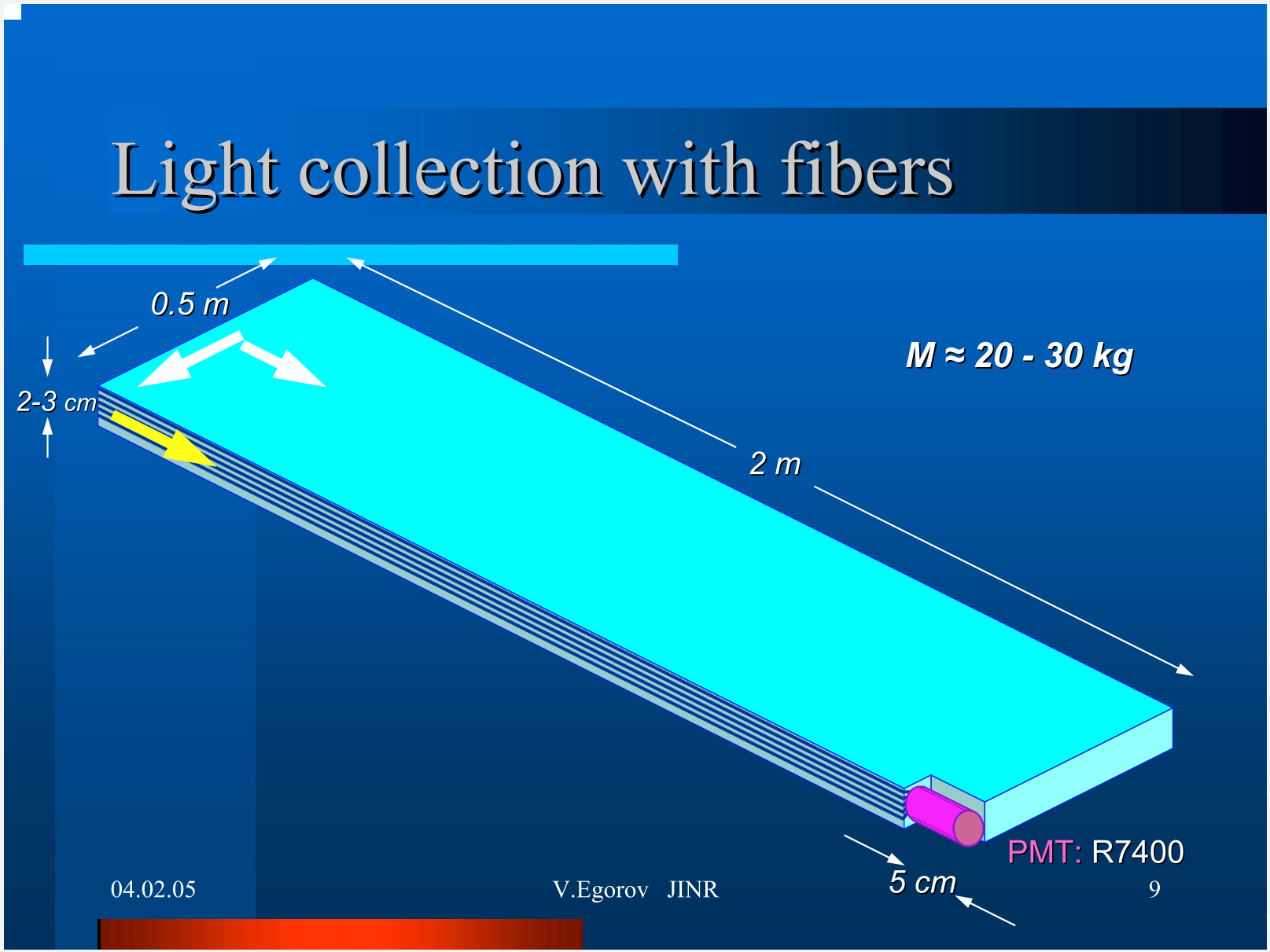

260 $\mu$ are dangerous

$r = 1,9 \cdot 10^{-6}$

$\varepsilon_C = 97\%$ feasible

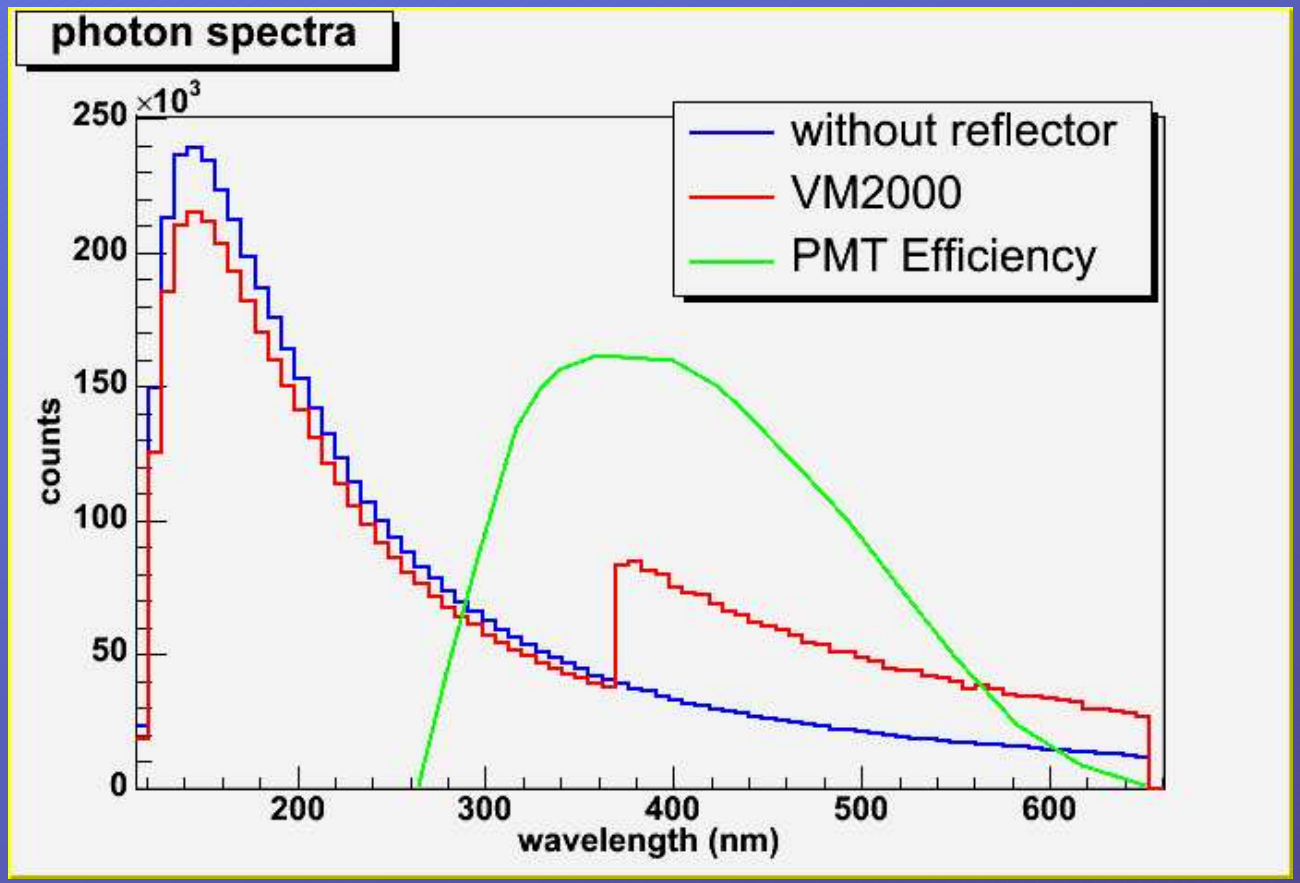
in water, coverage of 0,7%,
reflectivty ~0,9
n~0,6 pe/cm

# scintillator panel



# reflector foil & wavelength shifter

radiant mirror foil VM2000 by 3M

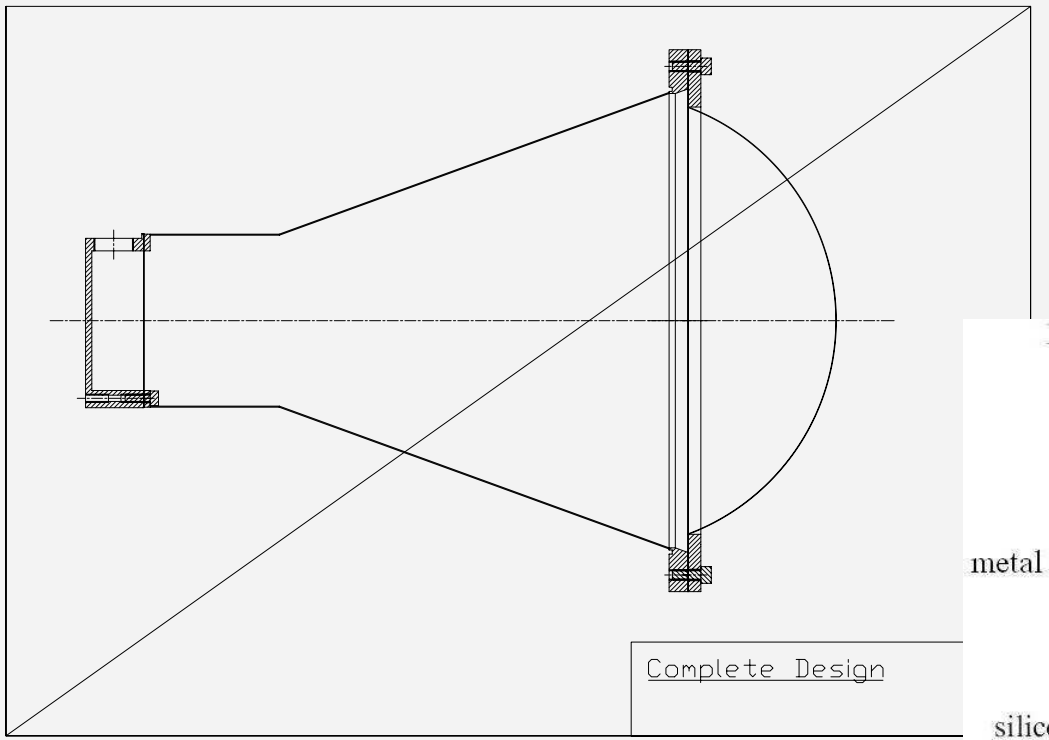



all walls ?
ph value of water

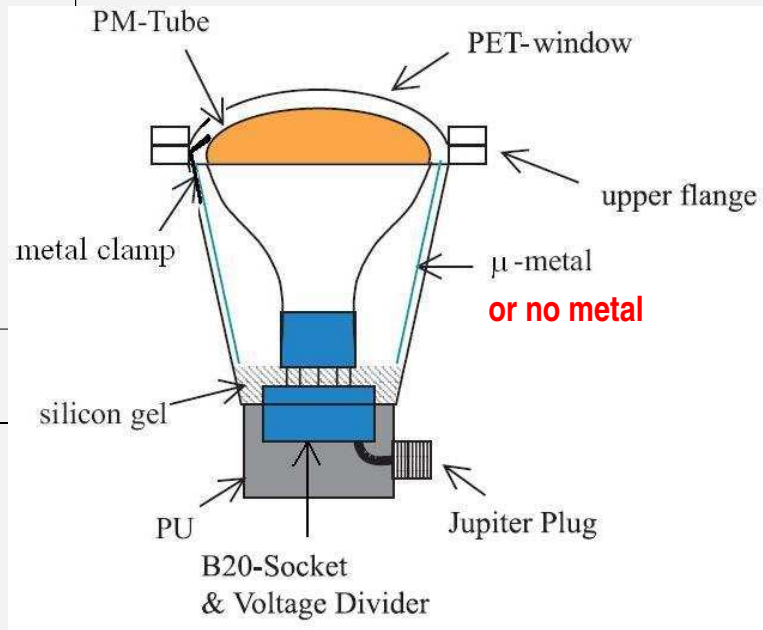
# The PMT encapsulation

Borexino type (Veto)

stainless steel, passivated; PET window




filled with oil



# The PMT encapsulation

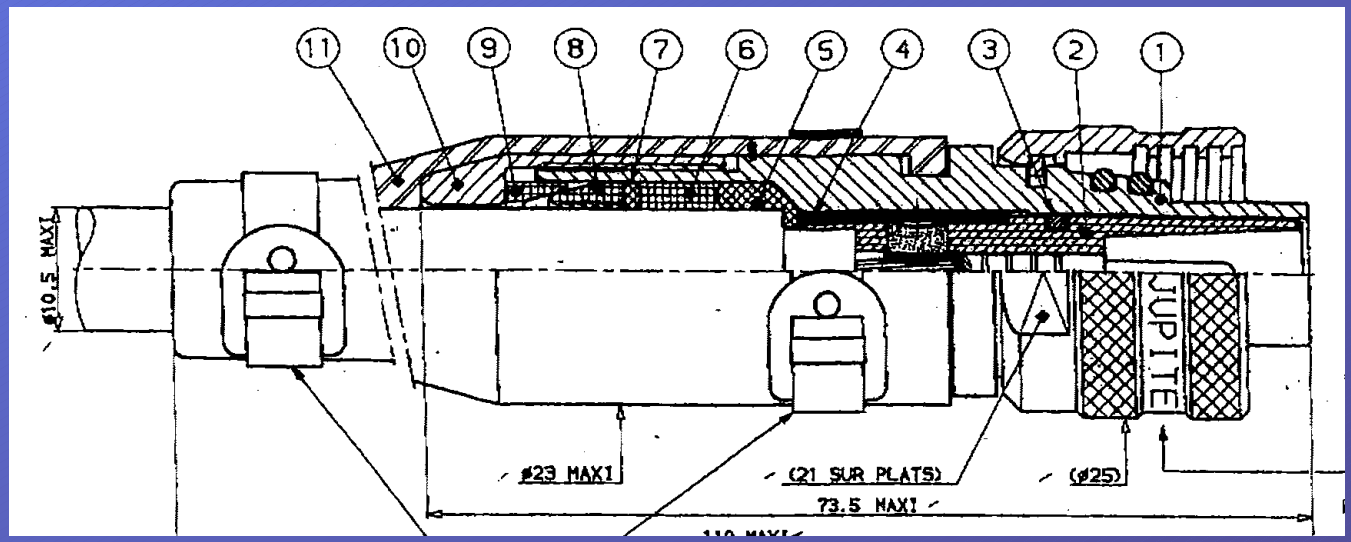
Borexino type (Veto)

DChooz reproduce radio assay; large geometrical variations; $\mu$ metal

# connectors & cables

connector “Jupiter”  water tight  $\Phi$ = 10,8mm

(Note: RG58 $\Phi$ = 5, mm, not watertight)



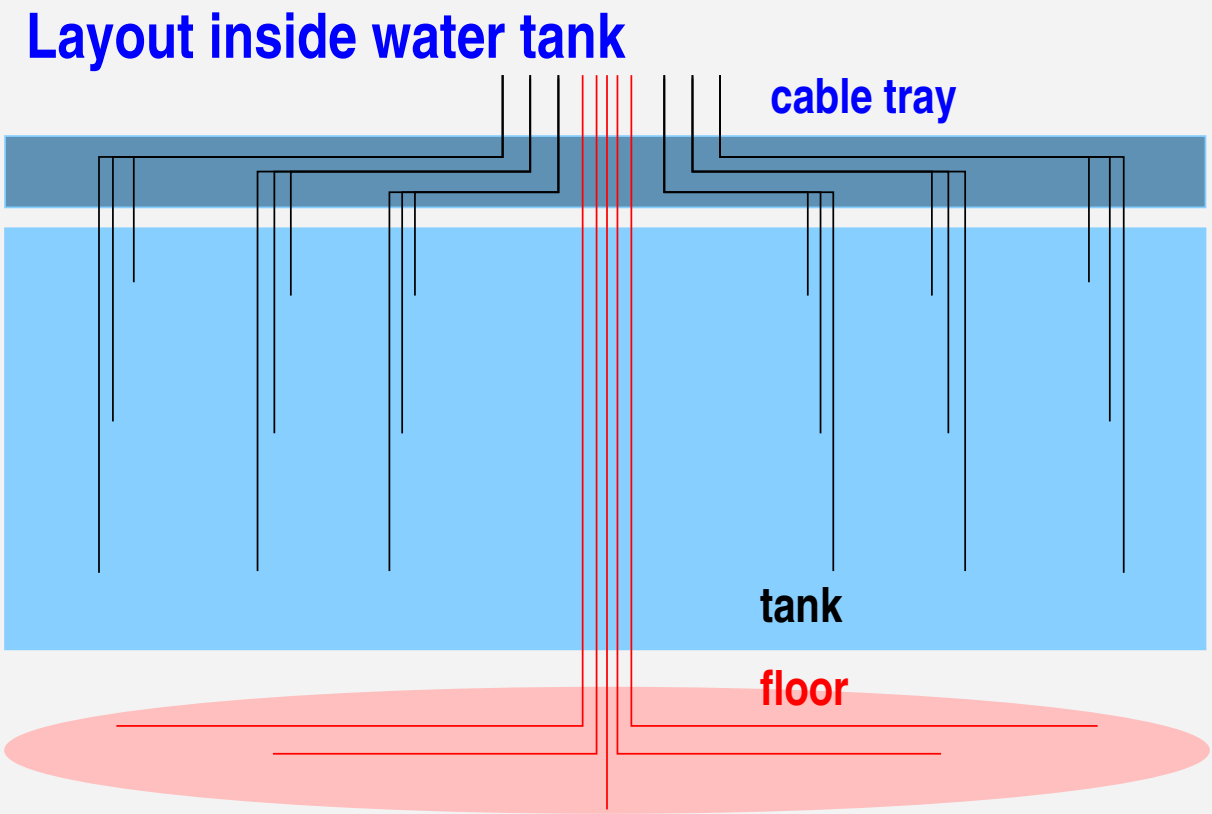

Huber+Suhner: water tight coating PUR

- G_12112: $\Phi$ = 18mm, $V_{max.op}$=12 kV, $\tau$=4,13ns/m
- S_07212: $\Phi$ = 10,8mm, $V_{max.op}$=1,05kV, $\tau$=5,03ns/m

total of 2km cables in water tank

# Layout for cables

several flanges for cables
service flanges




equal length PMT $\Longleftrightarrow$ flange

# Time table

Components in house:

- 30 PMT 9354KB delivered (ultra-low background)
- 1 roll of VM2000
- basic electronic moduls VME + crate
- quotations for encapsulation, pressure tank
- quotations for cables+connectors
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# Time table

- Dec 2005:
  - delivery of 70 PMT 9350KB (low background)
  - 2 prototype of housing
  - decision about cables, connectors, HV
- Feb 2006:
  - pressure tank operational
  - test of PMT encapsulation
- summer 2006:
  - mass production + testing
- fall 2006:
  - shipping to LNGS
  - mounting inside water tank AFTER pressure test of tank
  - cabling + DAQ test

# 3rd wall - draft