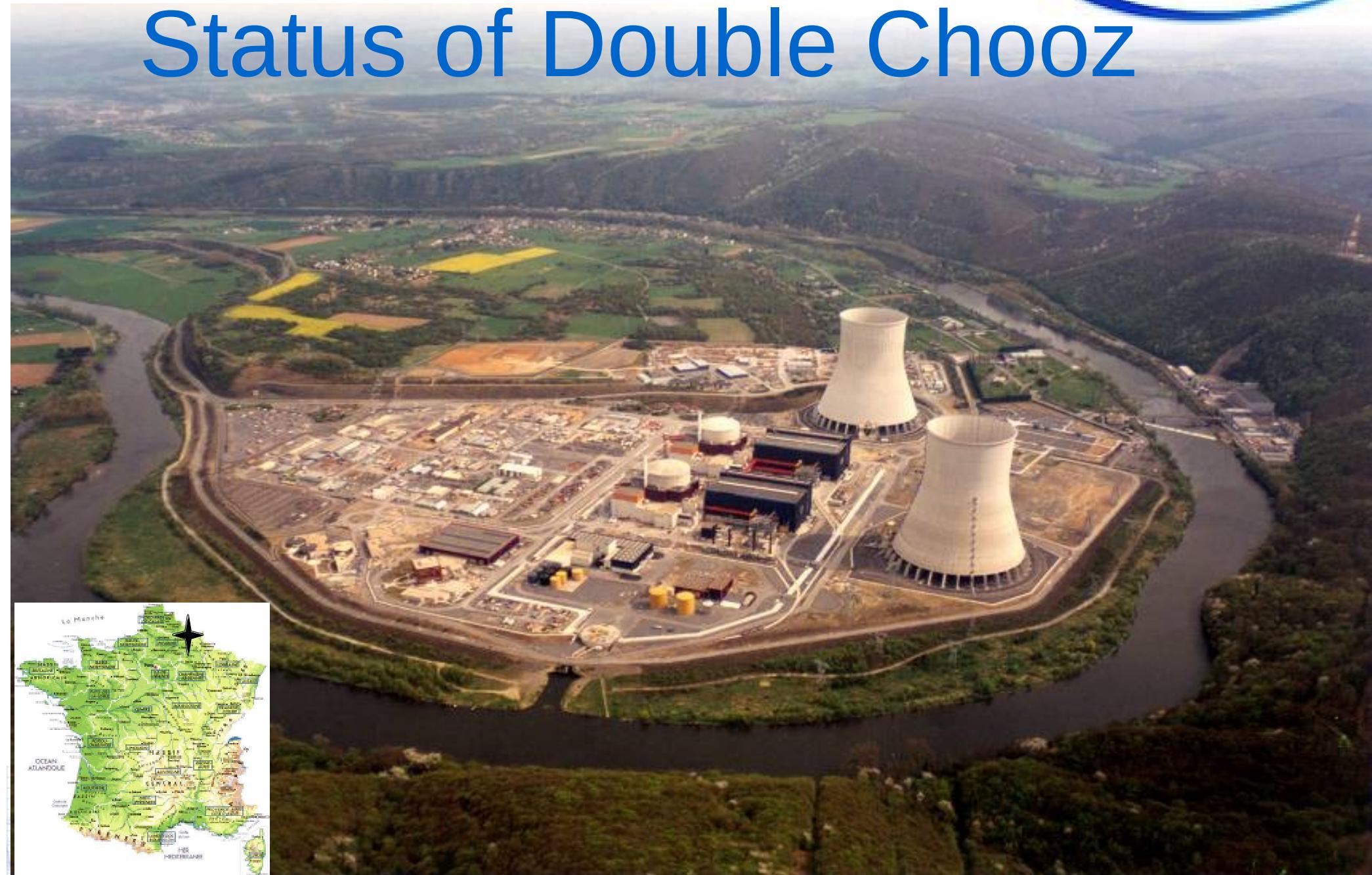


*Jaime Dawson,
APC, Paris*



Status of Double Chooz



DC Collaboration



France: APC Paris, CEA/Dapnia Saclay, Subatech Nantes, IPHC Strasbourg



Germany: Aachen, MPIK Heidelberg, TU München, EKU Tübingen, Hamburg



Spain: CIEMAT Madrid



UK: Sussex



Japan: HIT, Kobe, MUE, Niigata, TGU, TIT, TMU, Tohoku



Russia: RAS, RRC Kurchatov Institute

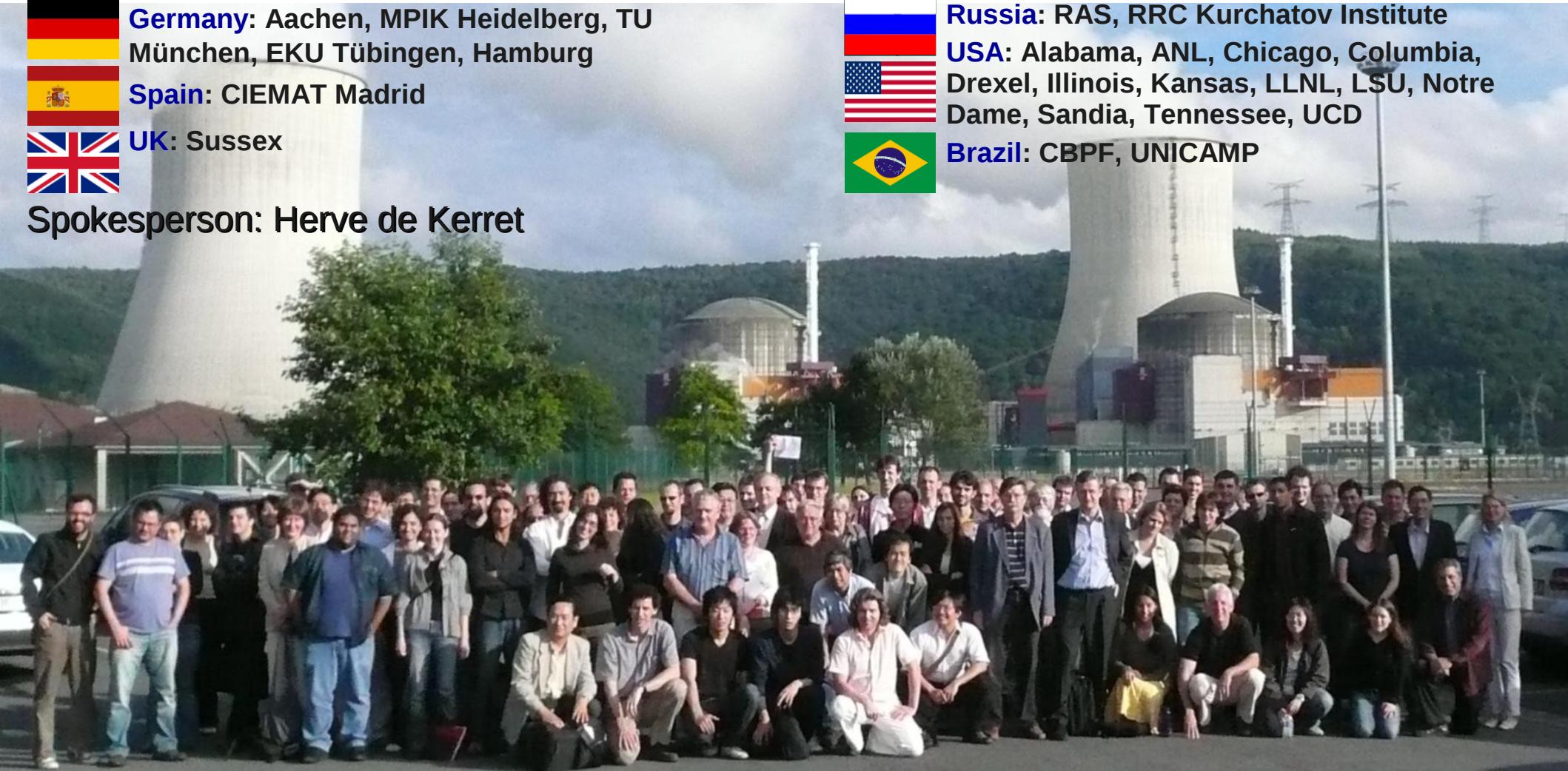


USA: Alabama, ANL, Chicago, Columbia, Drexel, Illinois, Kansas, LLNL, LSU, Notre Dame, Sandia, Tennessee, UCD

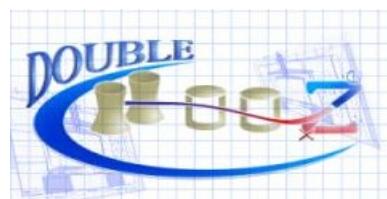


Brazil: CBPF, UNICAMP

Spokesperson: Herve de Kerret



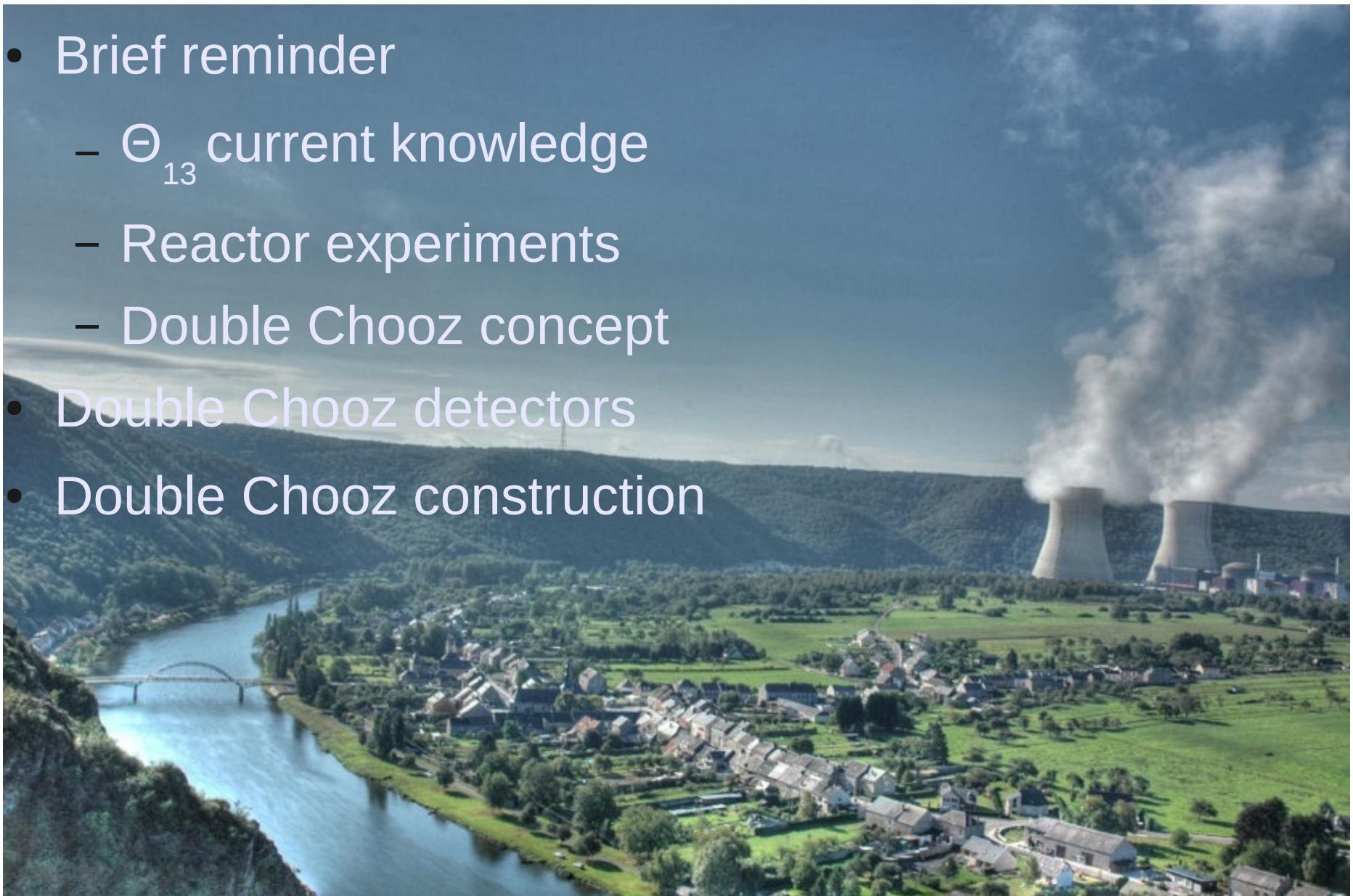
June 2008



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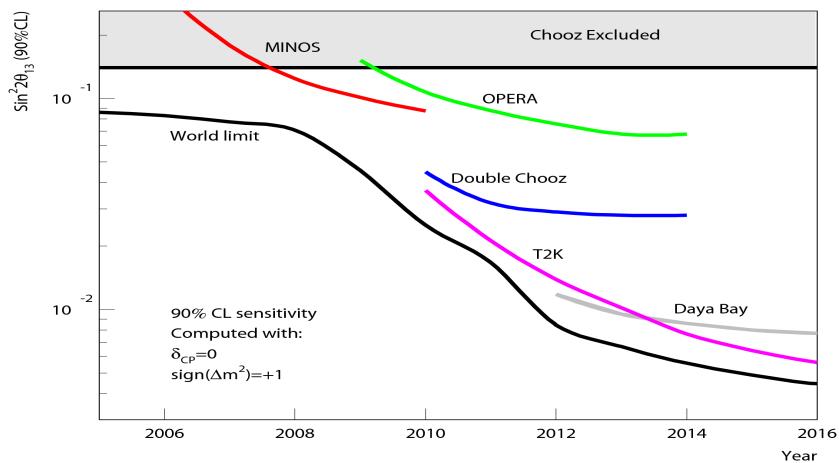
Contents

- Brief reminder
 - Θ_{13} current knowledge
 - Reactor experiments
 - Double Chooz concept
- Double Chooz detectors
- Double Chooz construction



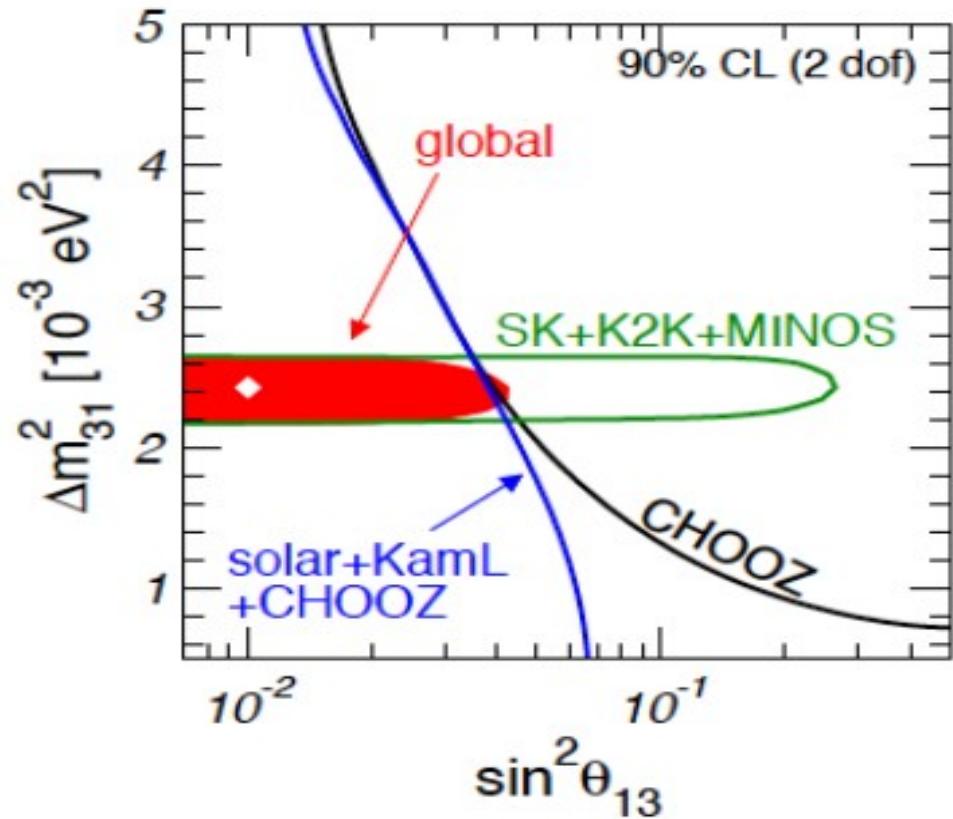
Θ_{13} – current knowledge

- global: $\sin^2(2\theta_{13}) < 0.13$ (90%)
– $\sin^2(\theta_{13}) < 0.035$ (90%)
- Dominated by Chooz [M.Apollonio et al, Eur. Phys. J. C27 (2003) 331]

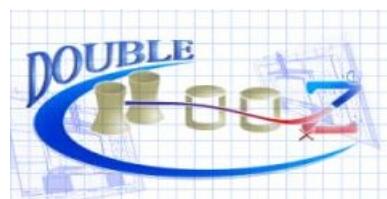


M. Mezzetto, Neutel 09

Maltoni and Schwetz,
arXiv:0812.3161

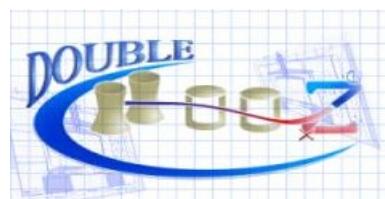
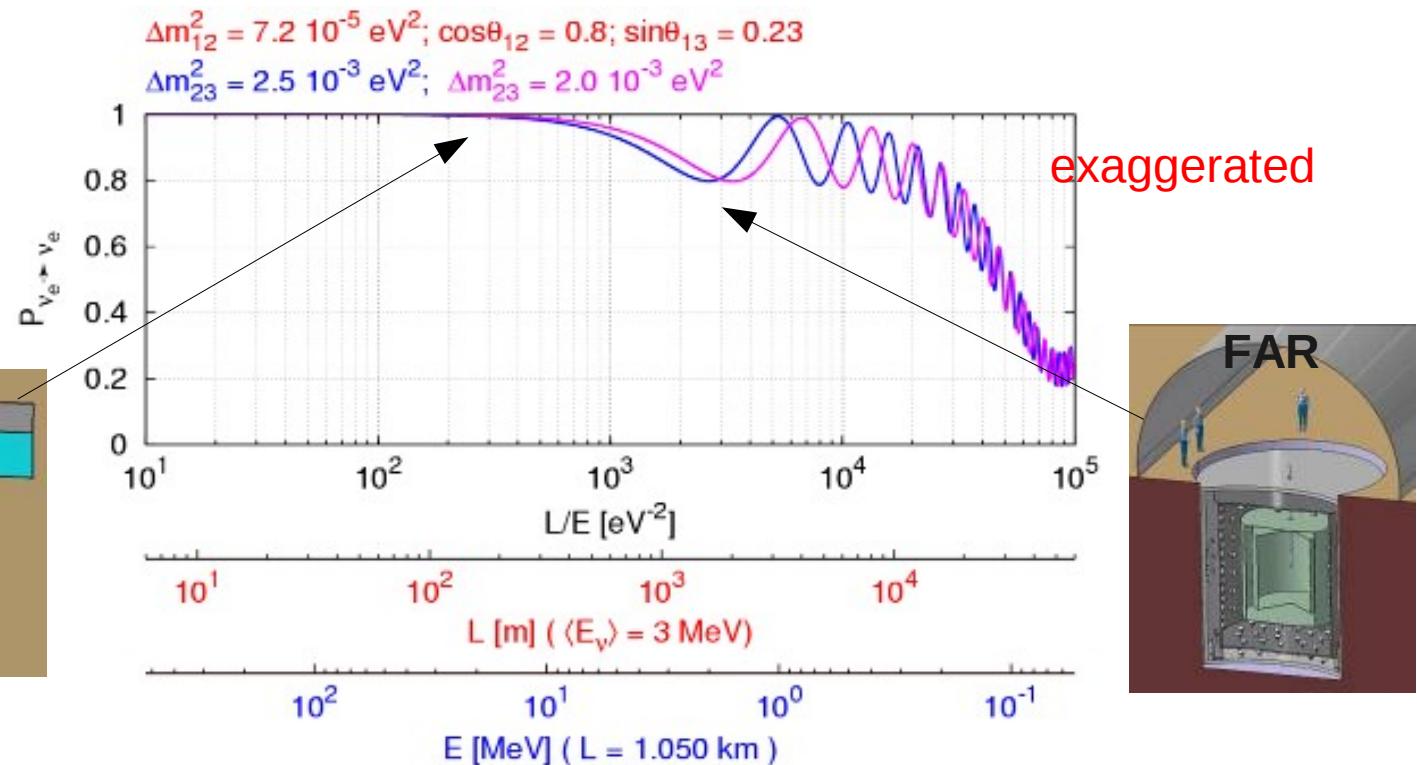


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Reactor Θ_{13} Experiments

- Disappearance of anti-neutrinos (independent of δ_{cp} and sign of Δm_{31} , weak dependence of Δm_{21})
- ~MeV signals, short distances (no matter effects)
- But, limited knowledge of processes inside reactor

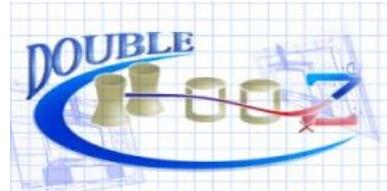


Concept

- 2 'identical' detectors
 - Near
 - 410 m
 - 115 m.w.e
 - ~500 v/day
 - Far
 - 1050 m
 - 300 m.w.e
 - ~70 v/day
- Systematics on reactor power, neutrino spectrum, cross-section insignificant for a relative measurement



Chooz-B
2 x 4.27GWh

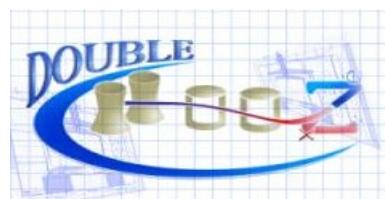
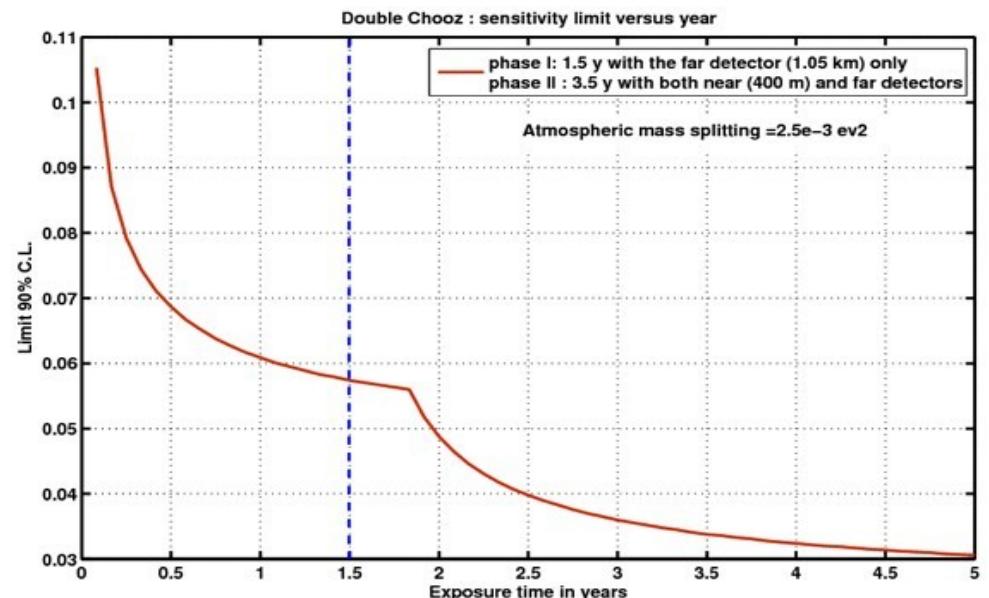


Improvements on Chooz

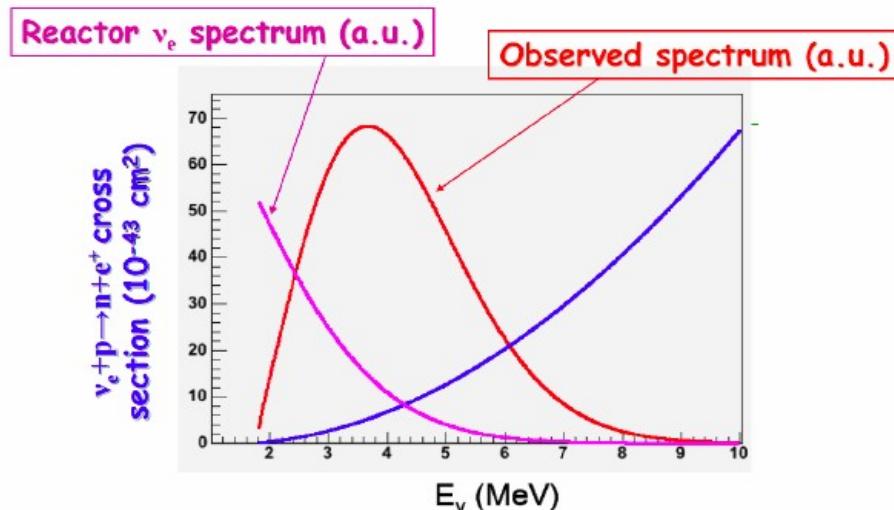
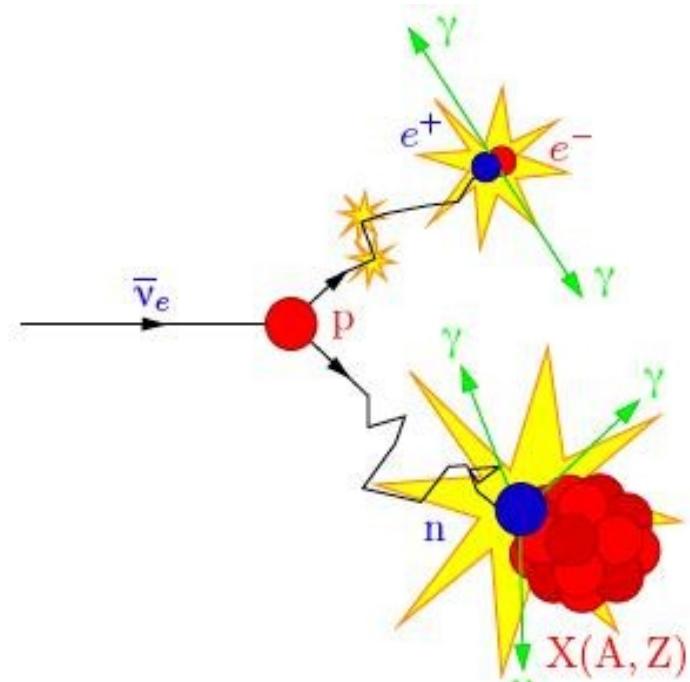
Chooz : $R = 1.01 \pm 2.8\% \text{ (stat)} \pm 2.7\% \text{ (syst)}$

- Statistical
 - Larger Volume $5.55\text{m}^3 \rightarrow 10.3\text{m}^3$
 - Run Time ~months $\rightarrow 3\text{-}5 \text{ yrs}$
 - Number of Events 2700 $\rightarrow 60,000$
(far detector in 3 yrs)
- 0.4 %
- Systematic
 - Reactor
 - Detector
 - Analysis
- $< 0.6\%$

- First phase – just far detector
 - (start early 2010)
- Second phase – both detectors
 - 2012
- Target sensitivity $\sin^2(2\theta_{13})$ of 0.03

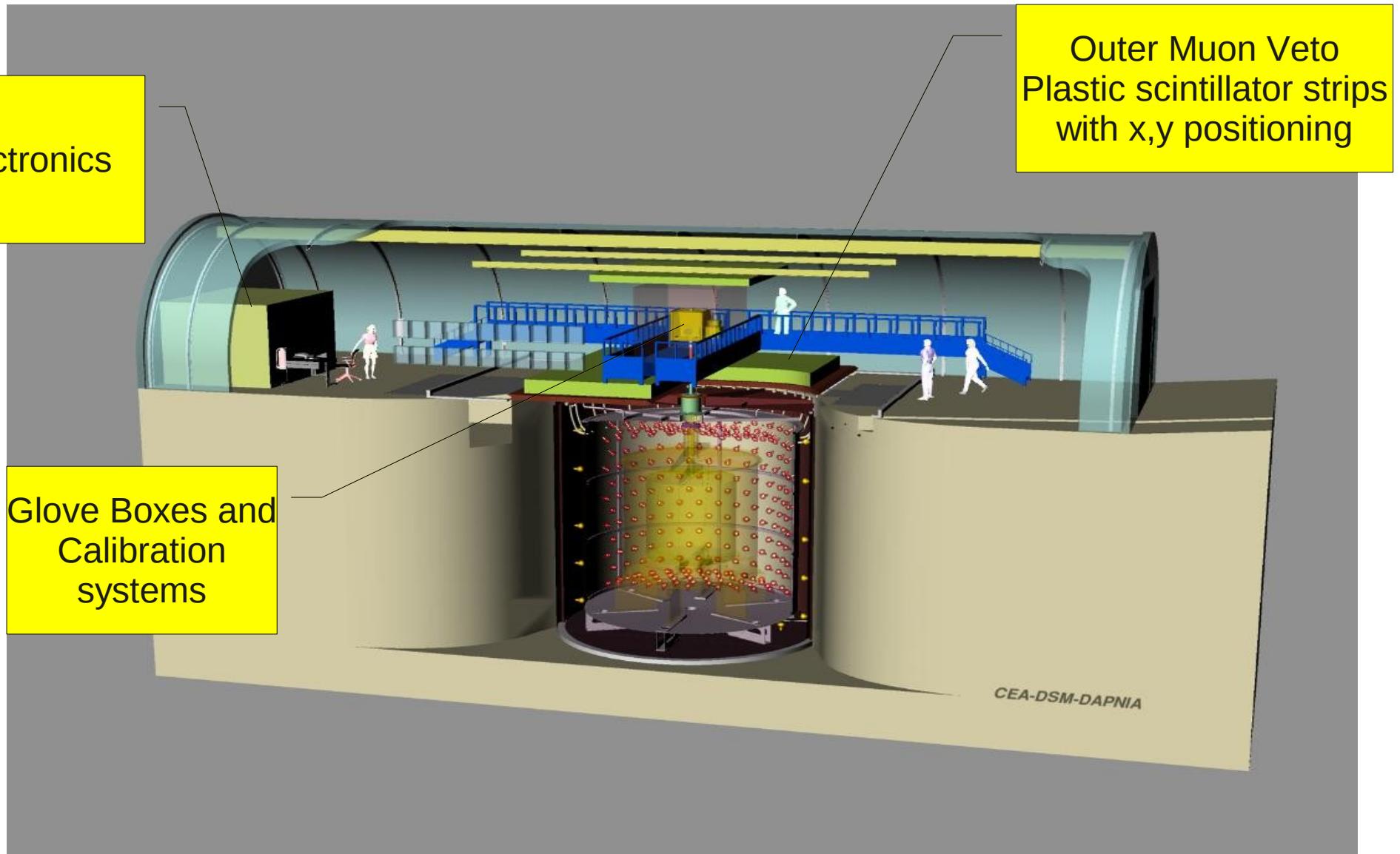


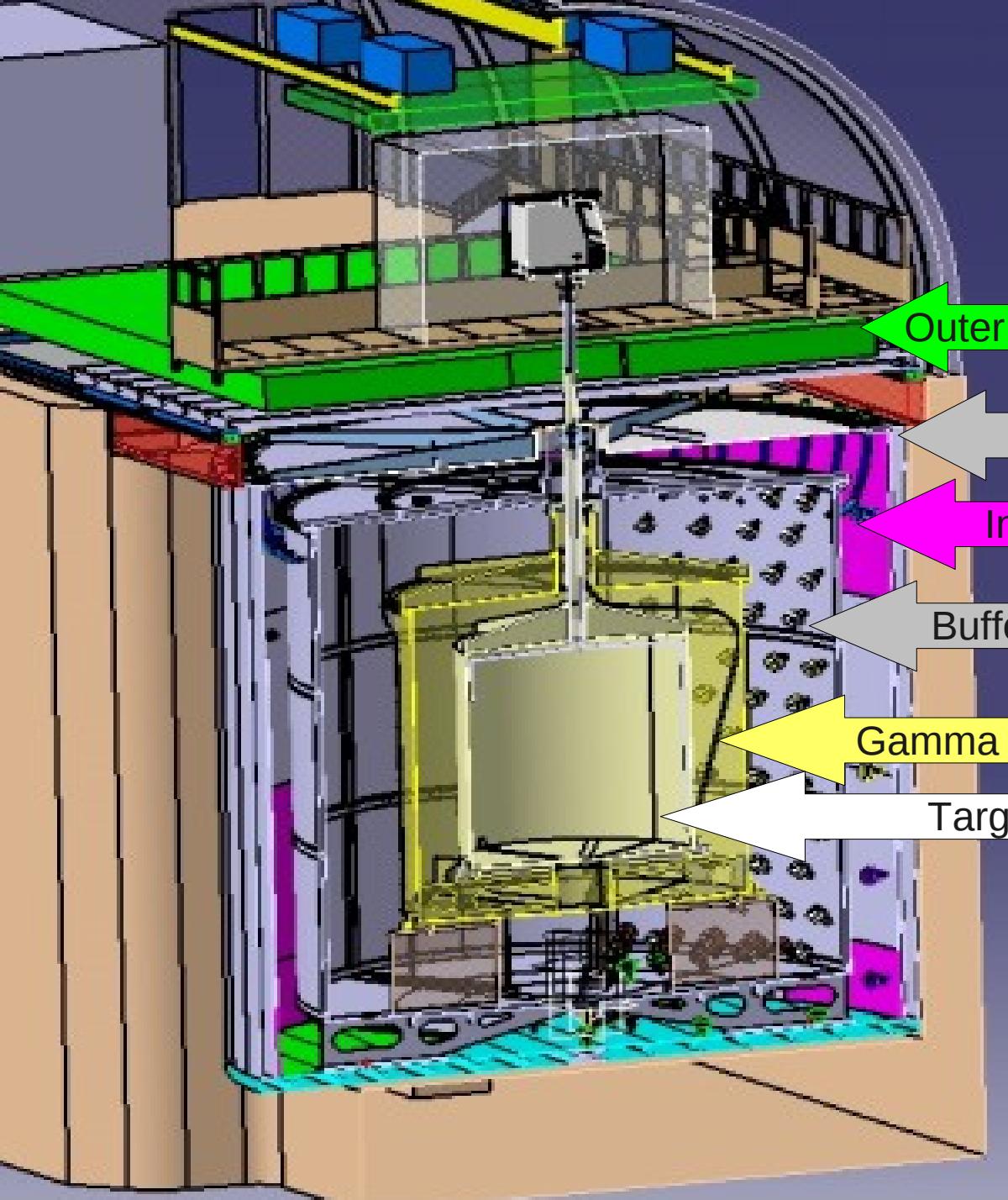
Neutrino Signal



- Detect anti-neutrinos via inverse beta decay
 - $p + \bar{\nu} \rightarrow n + e^+$
- In Gd- loaded scintillator
 - e^+ signal 1-8MeV
 - $e^+ e^-$ annihilation($2 \times 511 \text{ keV}$)
 - $E_{\text{vis}} = E_\nu - (M_n - M_p) + m_e$
 - Delayed neutron capture on
 - Gd $\sim 30 \mu\text{s} \sim 8 \text{ MeV} (>80\%)$
 - H 2.2 MeV

The Laboratories





Outer Muon Veto Strips of plastic scintillator

Shielding 15 cm demagnetized steel

Inner Veto 78 8" PMTs, scintillator

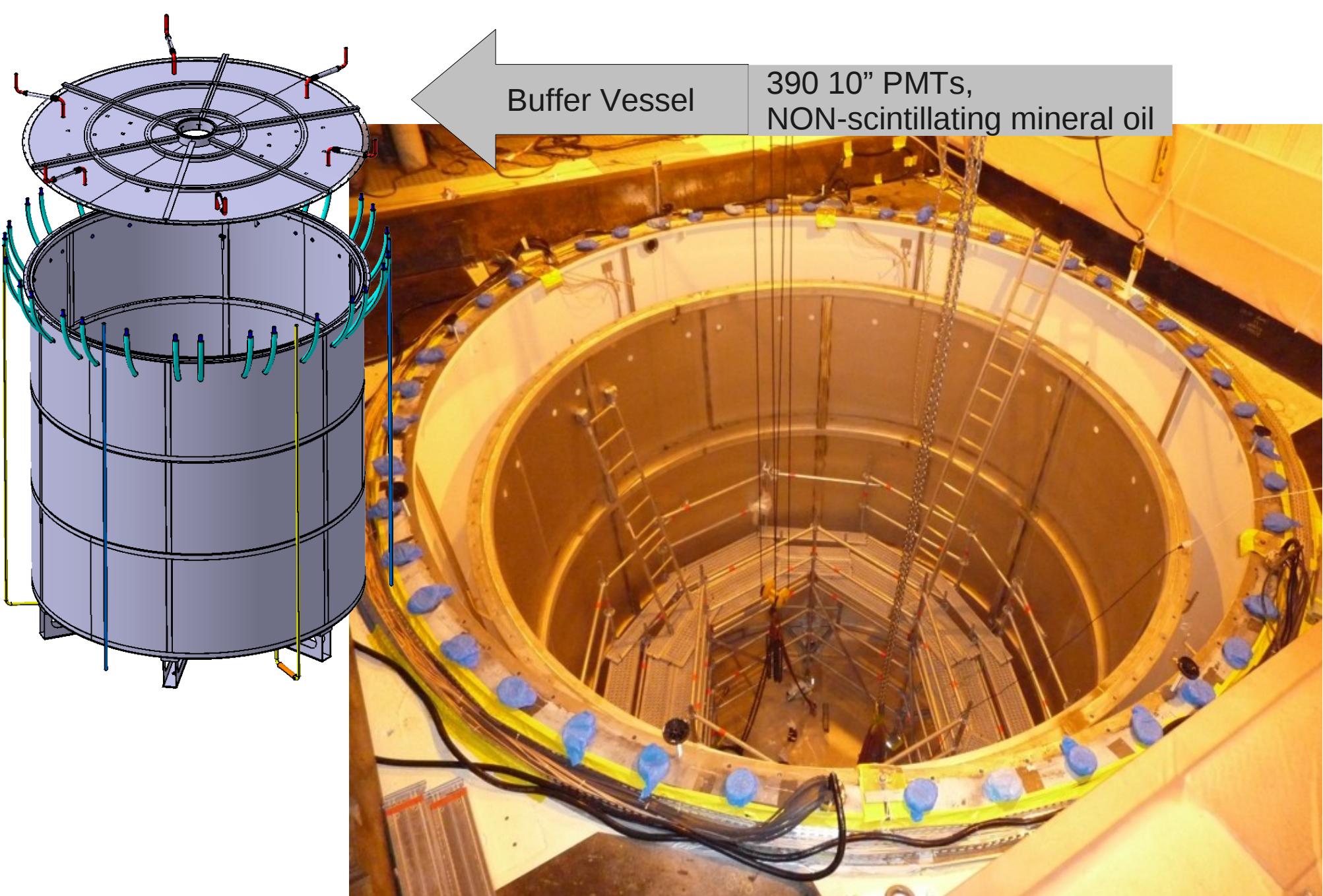
Buffer Vessel 390 10" PMTs,
NON-scintillating mineral oil
Scintillator (acrylic)

Gamma Catcher
Target 10.3m³ Gd-loaded
Scintillator (acrylic)

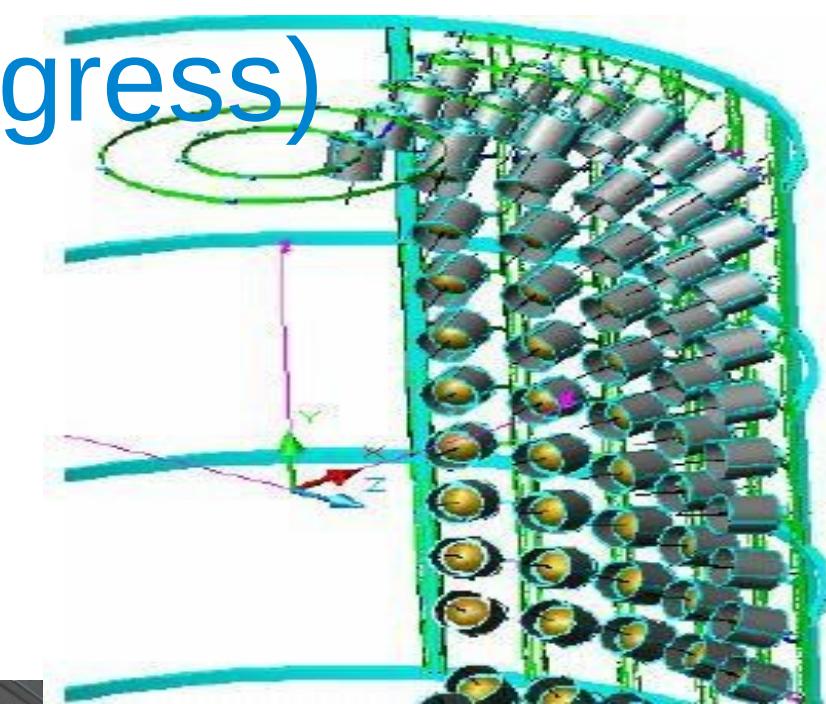
Construction of Far Detector



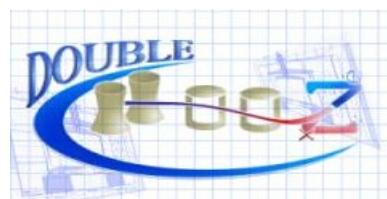
Lab for the original Chooz experiment



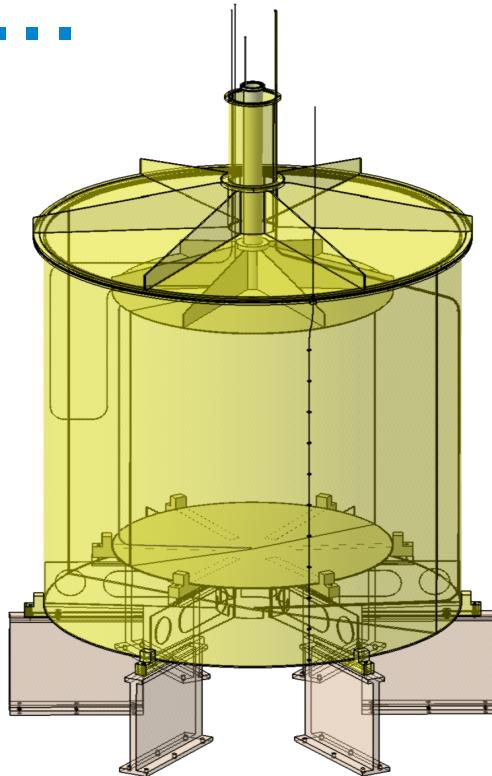
PMT Installation (in progress)



Japanese groups currently at Chooz and working hard!



Next...



- July – August Acrylics
- September Closing of detector
- October Electronics
- November Detector Filling
- January Commissioning Starts
- Shielding completed
- Outer Muon Veto
- March Glove Box
- April Detector completed

