

## STEREO status

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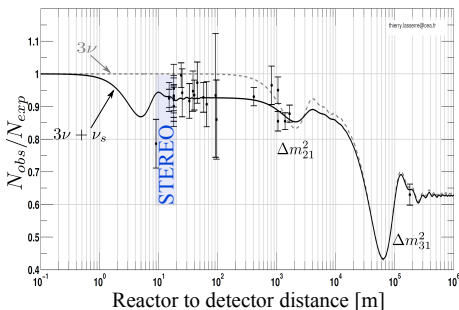
December 2015



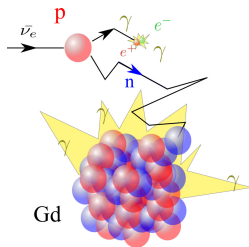
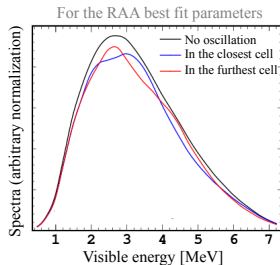
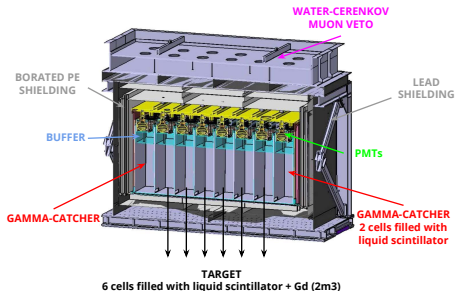
- Reactor outgoing  $\bar{\nu}_e$  flux predictions revised : +3 to 6%.
- Neutron lifetime updated :  $\sigma_{IBD} \propto 1/\tau_n \rightarrow +1.5\%$ .
- $\nu$  experiments revisited + Daya Bay result :
  - ▶  $\bar{\nu}_e$  deficit :  $P_{\bar{\nu}_e \rightarrow \bar{\nu}_e} = 0.924(23)$ .

- Reactor Antineutrino Anomaly (RAA) at  $2.7\sigma$  + Gallium anomaly.
- New physics at short baseline ?

- An extra sterile  $\nu$  with a mass O(eV) could explain the RAA and GaA.

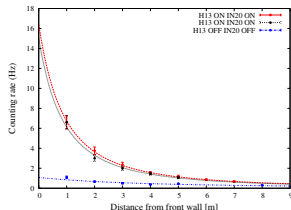
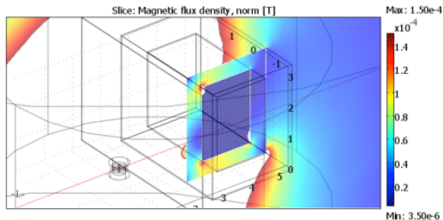
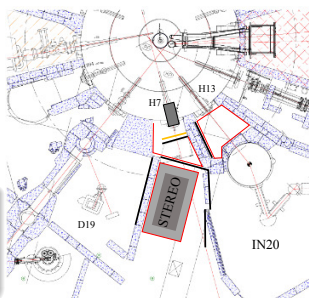


- Goal : Unambiguous oscillation in energy and distance obs. @ short baseline.
- Close to the reactor core : ILL @ 10m.
- Relative spectrum distortions with distance : segmented detector.
- Accurate detector response : Gd-loaded liquid scintillator time-honored technology.



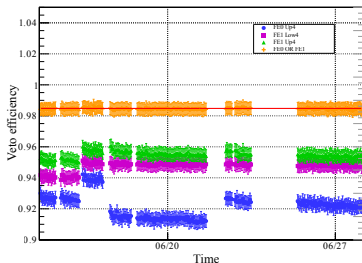
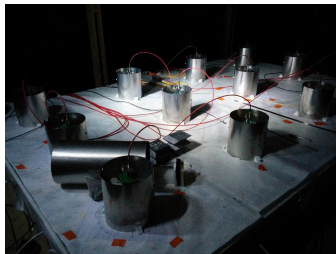
## Background / Shielding status

- On site background measurements ( $\gamma$ , n).
- Main sources identified.
  - ▶ Fast neutrons from front.
  - ▶ Neutrons /  $\gamma$  from IN20/D19.
- Intense magnetic field from IN20.
  - Lead and PE front walls installed.
    - ▶ Fast neutron background divided by 5.
  - Design and **validation** of extra protections.



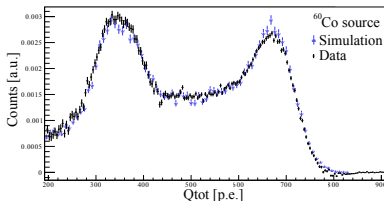
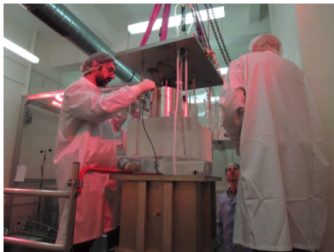
## Detector developments

- $\mu$  veto prototype (LPSC)
  - ▶ 98.5% detection efficiency.
  - ▶ Final veto delivered.
- Cell prototype
- Calibration system prototype. (LAPP)
- Liquid scintillator
- PMTs + basis (LPSC)
- Electronics (LPSC)
- Data acquisition (LPSC)



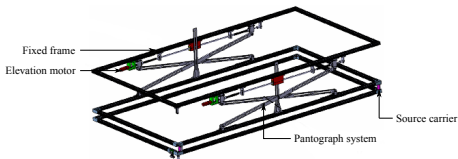
## Detector developments

- $\mu$  veto prototype (LPSC)
- Cell prototype
  - ▶ **Validation** of light and energy response.
- Calibration system prototype. (LAPP)
- Liquid scintillator
- PMTs + basis (LPSC)
- Electronics (LPSC)
- Data acquisition (LPSC)



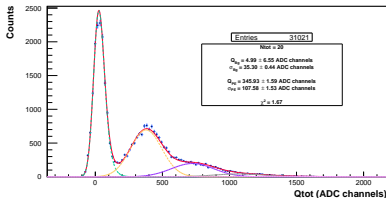
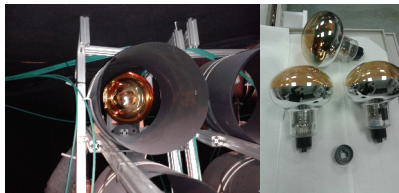
## Detector developments

- $\mu$  veto prototype (LPSC)
- Cell prototype
- Calibration system prototype. (LAPP)
  - ▶ Automated source circulation.
  - ▶ Under test.
- Liquid scintillator
- PMTs + basis (LPSC)
- Electronics (LPSC)
- Data acquisition (LPSC)



## Detector developments

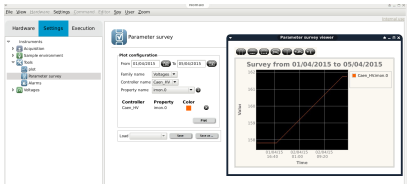
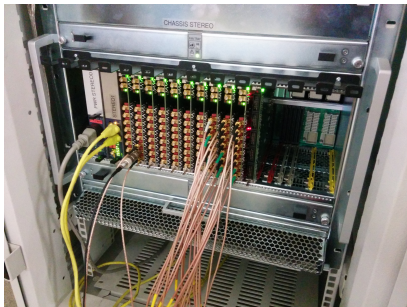
- $\mu$  veto prototype (LPSC)
- Cell prototype
- Calibration system prototype. (LAPP)
- Liquid scintillator
  - ▶ Stable after 2 years.
  - ▶ All components delivered.
- PMTs + basis (LPSC)
  - ▶ **Delivered and tested @ Heidelberg.**
- Electronics (LPSC)
- Data acquisition (LPSC)





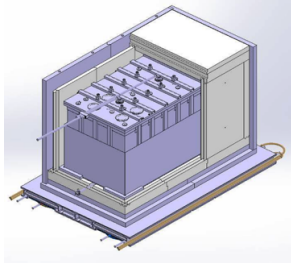
## Detector developments

- $\mu$  veto prototype (LPSC)
- Cell prototype
- Calibration system prototype. (LAPP)
- Liquid scintillator
- PMTs + basis (LPSC)
- Electronics (LPSC)
  - ▶ FE boards, LED driver and trigger board **ready**.
- Data acquisition (LPSC)
  - ▶ **Running**.
  - ▶ Slow control dev. ongoing.



## Technical design and construction

- **Construction phase started.**
- Inner detector design **validated** and order placed.
  - ▶ Detector vessel delivered mid February.
  - ▶ Buffer delivered, mounting start at LPSC.
- Design and **validation** of internal shieldings (LAPP).
  - ▶ Order placed for support structure.
  - ▶ Pb shielding call for tenders about to be launched.
- Lead/PE front wall mounted.





- **PMT assembly in buffers.**
- D19 and IN20 external shieldings delivery.
- Inner detector integration at LPSC.
- Internal shieldings delivery (maybe in May).
- Inner detector transportation to ILL.
- **First data.**



- PMT assembly in buffers.
- D19 and IN20 external shieldings delivery.
- Inner detector integration at LPSC.
- Internal shieldings delivery (maybe in May).
- Inner detector transportation to ILL.
- **First data.**



- PMT assembly in buffers.
- D19 and IN20 external shieldings delivery.
- Inner detector integration at LPSC.
- Internal shieldings delivery (maybe in May).
- Inner detector transportation to ILL.
- **First data.**



- PMT assembly in buffers.
- D19 and IN20 external shieldings delivery.
- Inner detector integration at LPSC.
- Internal shieldings delivery (maybe in May).
- Inner detector transportation to ILL.
- **First data.**

- STEREO : experiment with a **high discovery potential**.
- All detector parts under fabrication or already delivered.
- Last prototypes under test to validate the detector response.
- **Construction of the final detector ongoing.**
- Tight schedule but we should get first data in **Summer 2016 !**

Thanks for your attention !



## Sensitivity contour

