



Chasing the Light Sterile Neutrino with the Stereo Experiment

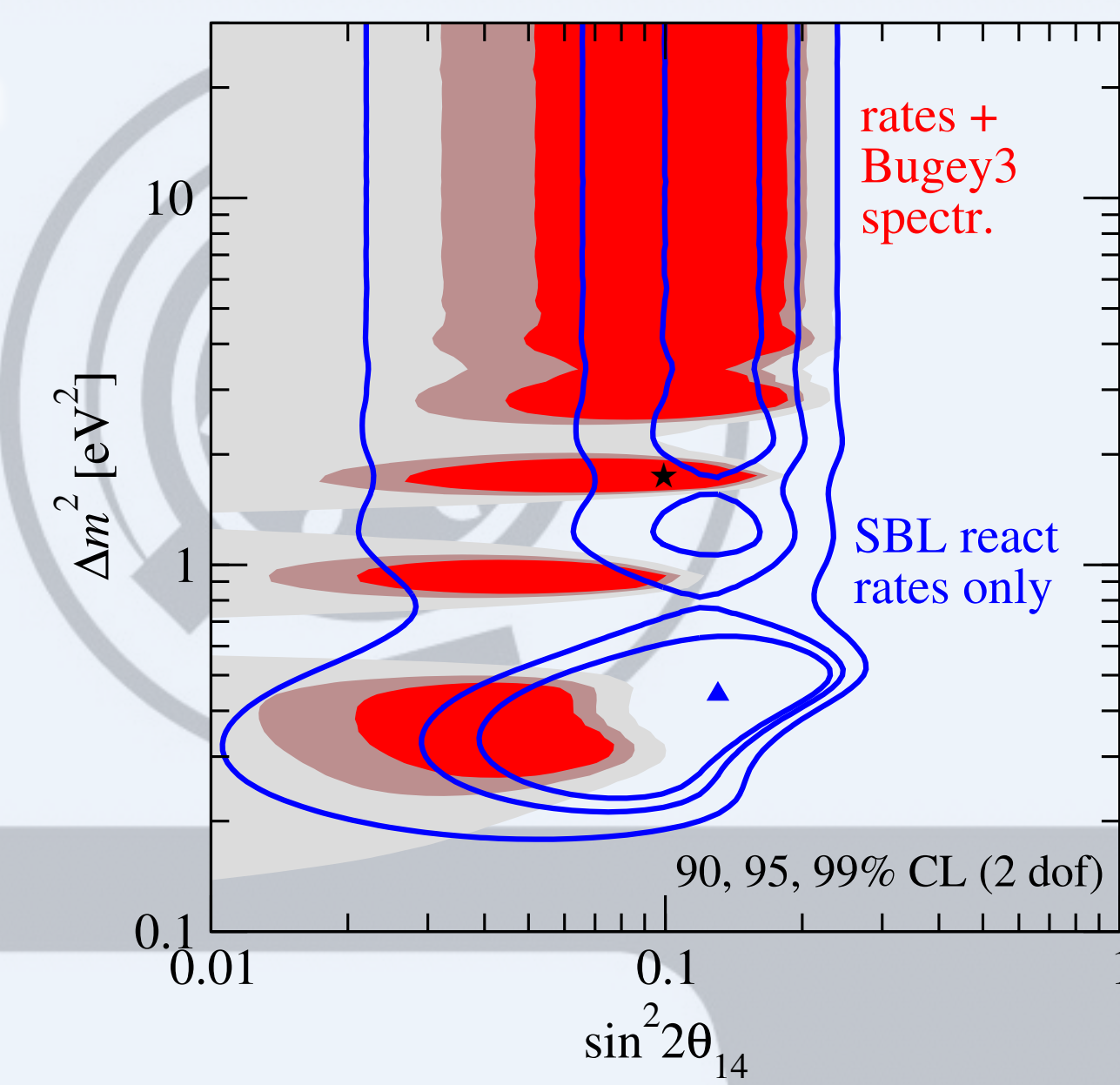
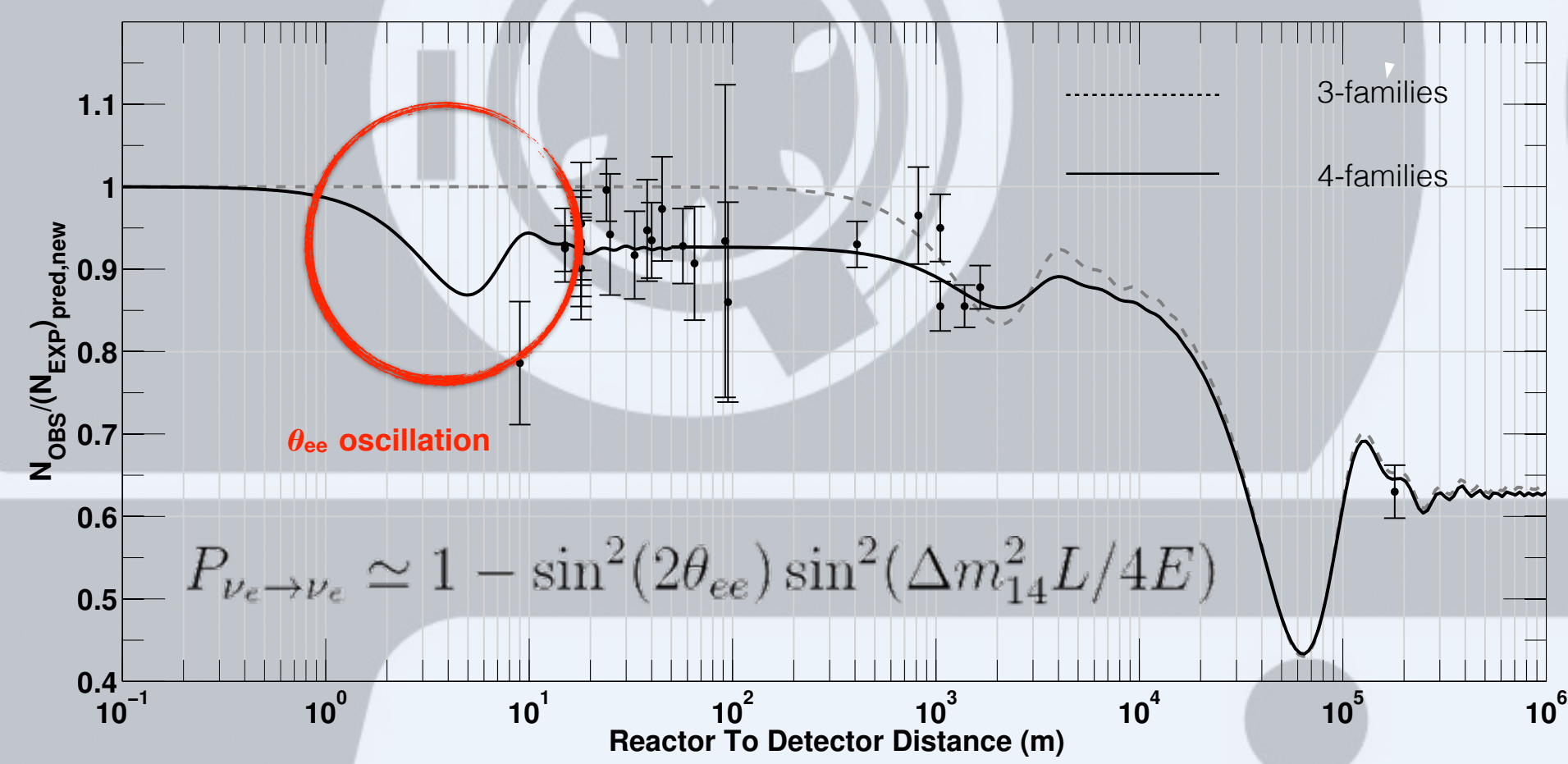
A. Minotti - IRFU/SPhN CEA Saclay
on behalf of the STEREO collaboration



REACTOR NEUTRINO ANOMALY

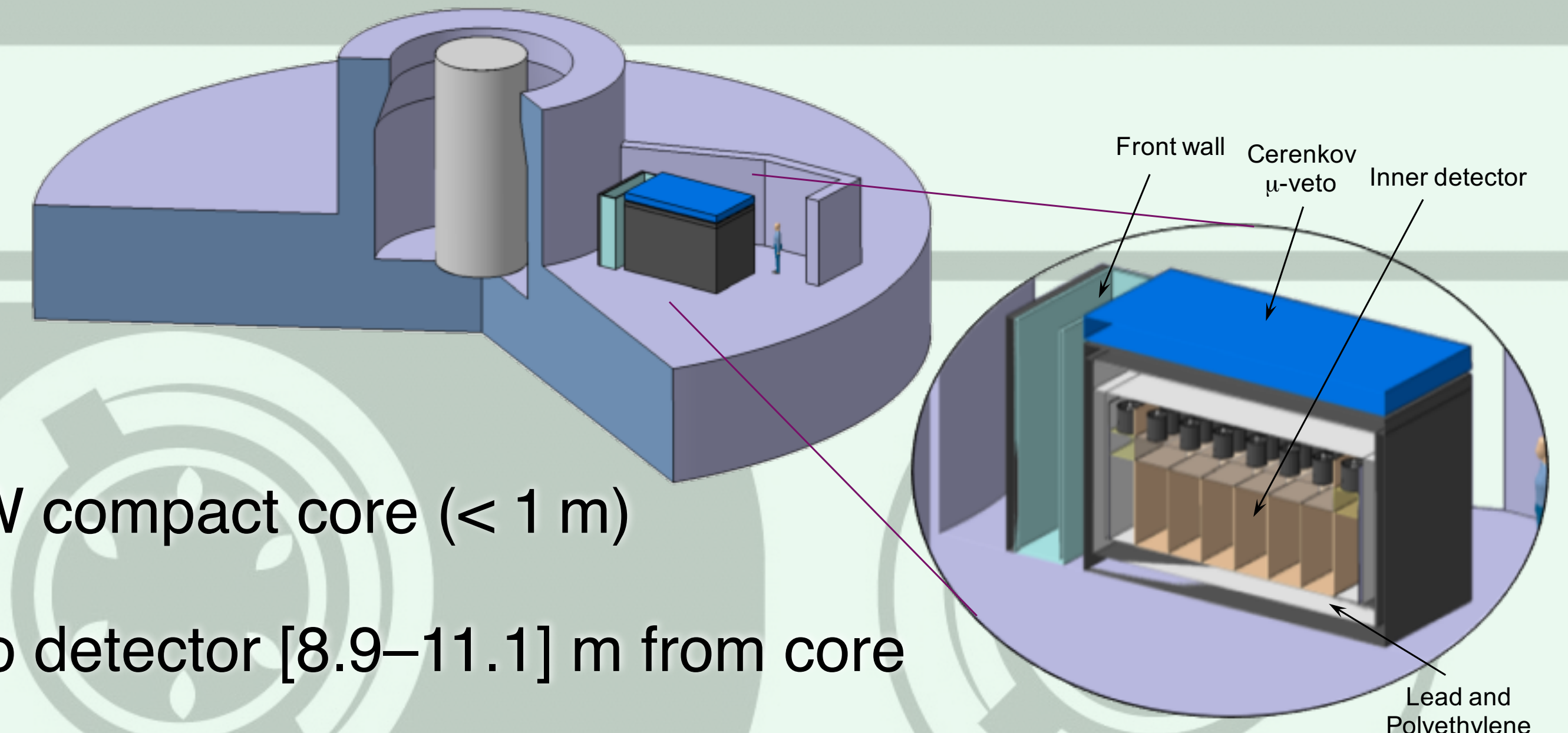
- New computation of reactor $\bar{\nu}$ spectrum for Double Chooz: $\sim 6\%$ flux deficit in previous reactor experiments [1]

- Possible explanation: Oscillation with an extra sterile neutrino @ $\Delta m^2 \sim 1 \text{ eV}^2$

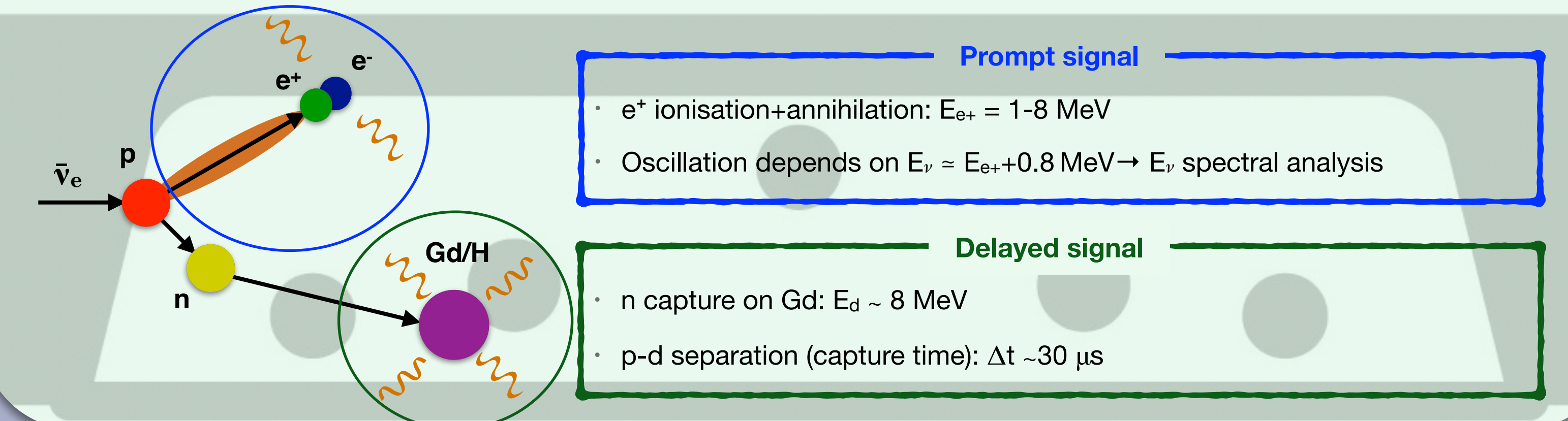


- Current reactor neutrino experiments too similar and little sensitive to a fixed spectrum distortion \Rightarrow Need investigation

THE STEREO EXPERIMENT @ ILL REACTOR

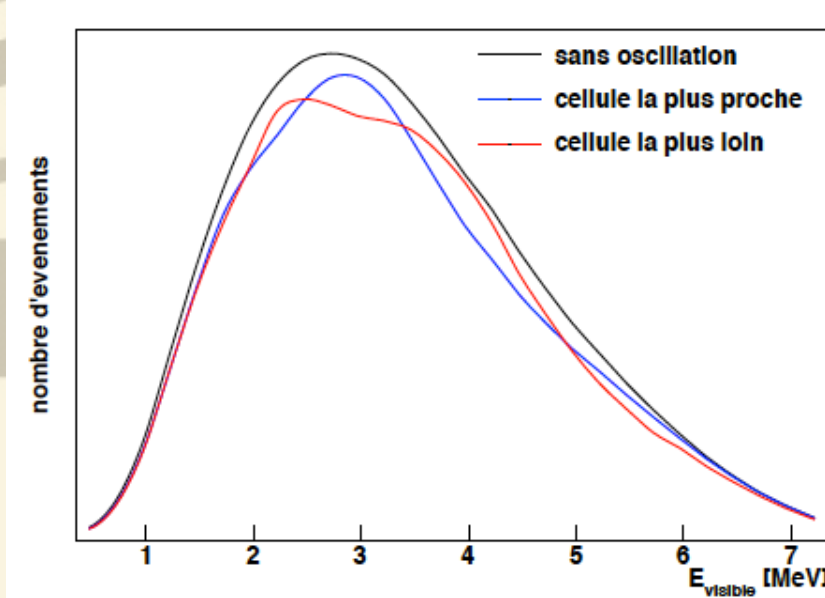
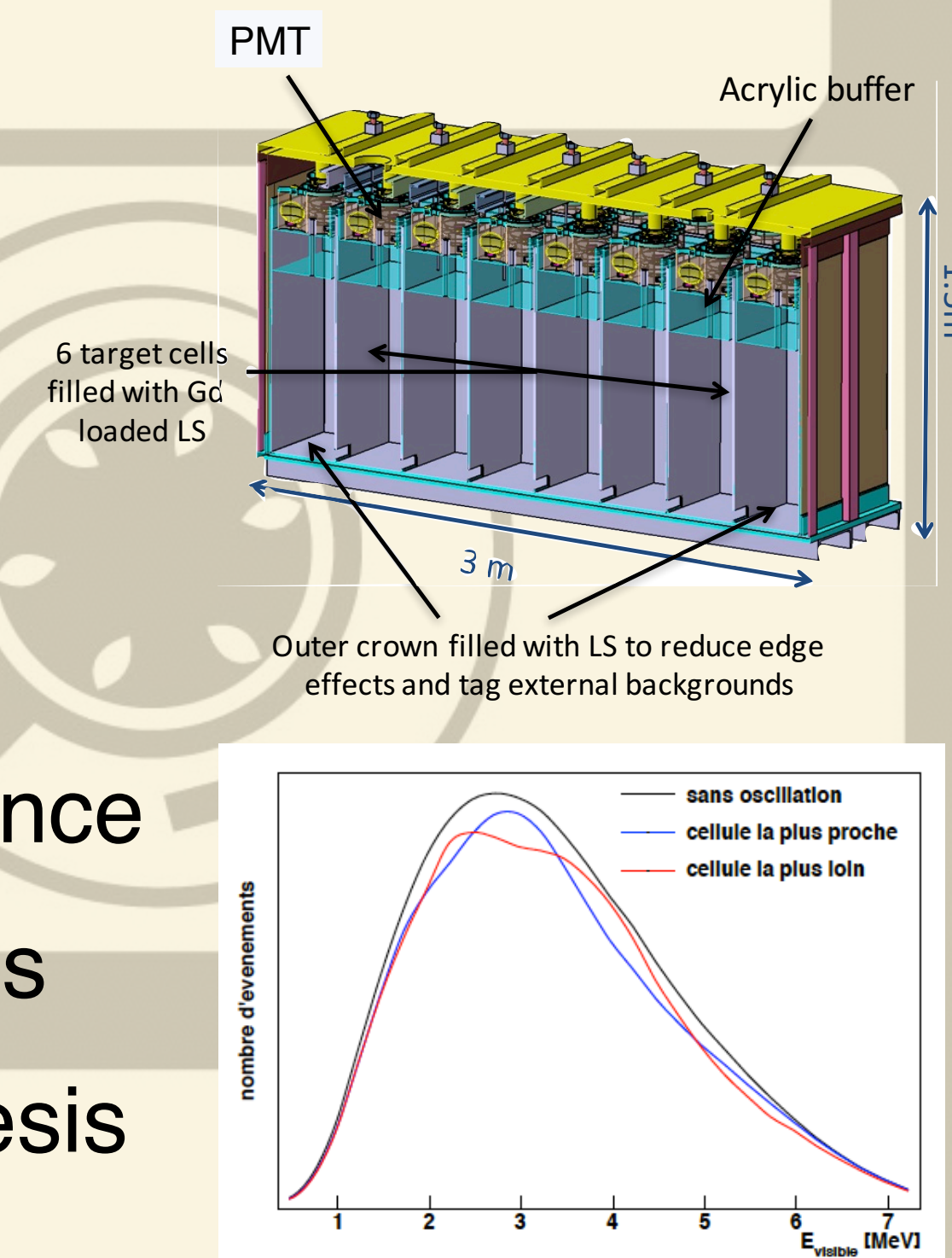


- 57 MW compact core ($< 1 \text{ m}$)
- Stereo detector [8.9–11.1] m from core
- ν detection via inverse beta decay interaction in liquid scintillator: twofold coincidence



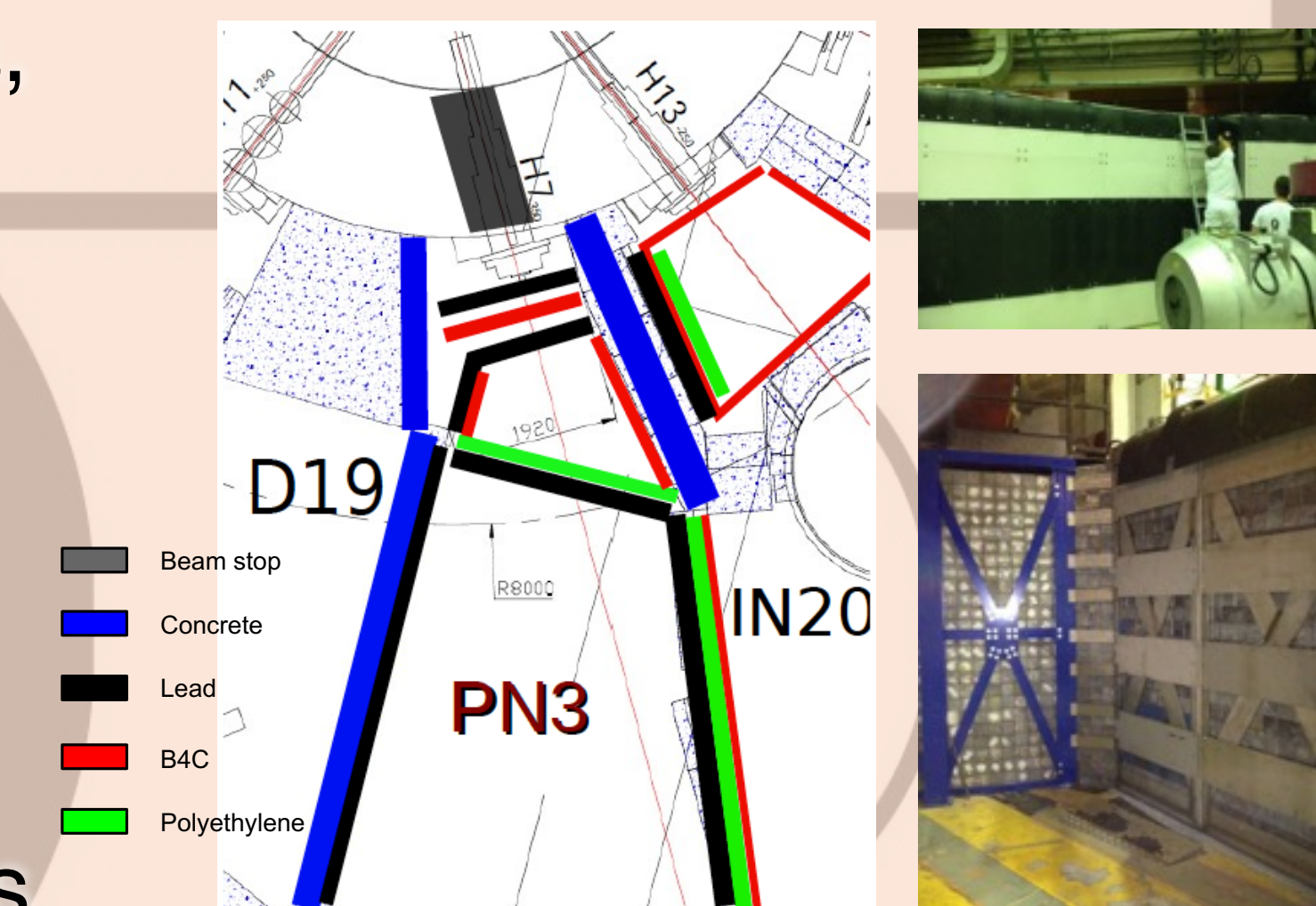
STEREO DETECTOR

- Stereo inner detector
 - 6 target cells and outer crown filled with liquid scintillator
 - 48 PMTs in upper acrylic buffer
- Looking for oscillation patterns @ short distance
 - Relative energy shape in the 6 identical cells
 - Sensitive test of the sterile neutrino hypothesis



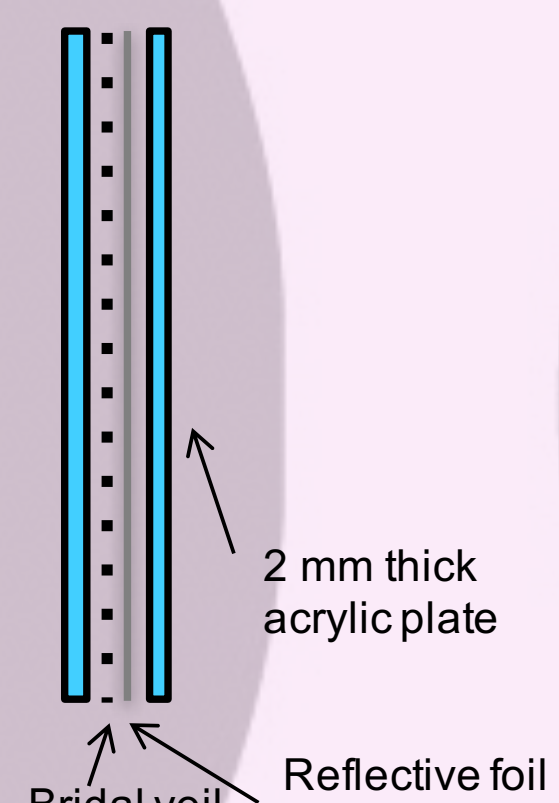
BACKGROUND MITIGATION

- Full on-site measurements of μ , n and γ background
- Reactor background reduced with lead + B + CH₂ shielding
- Cosmic background controlled with active μ veto, online PSD, and subtraction from off periods

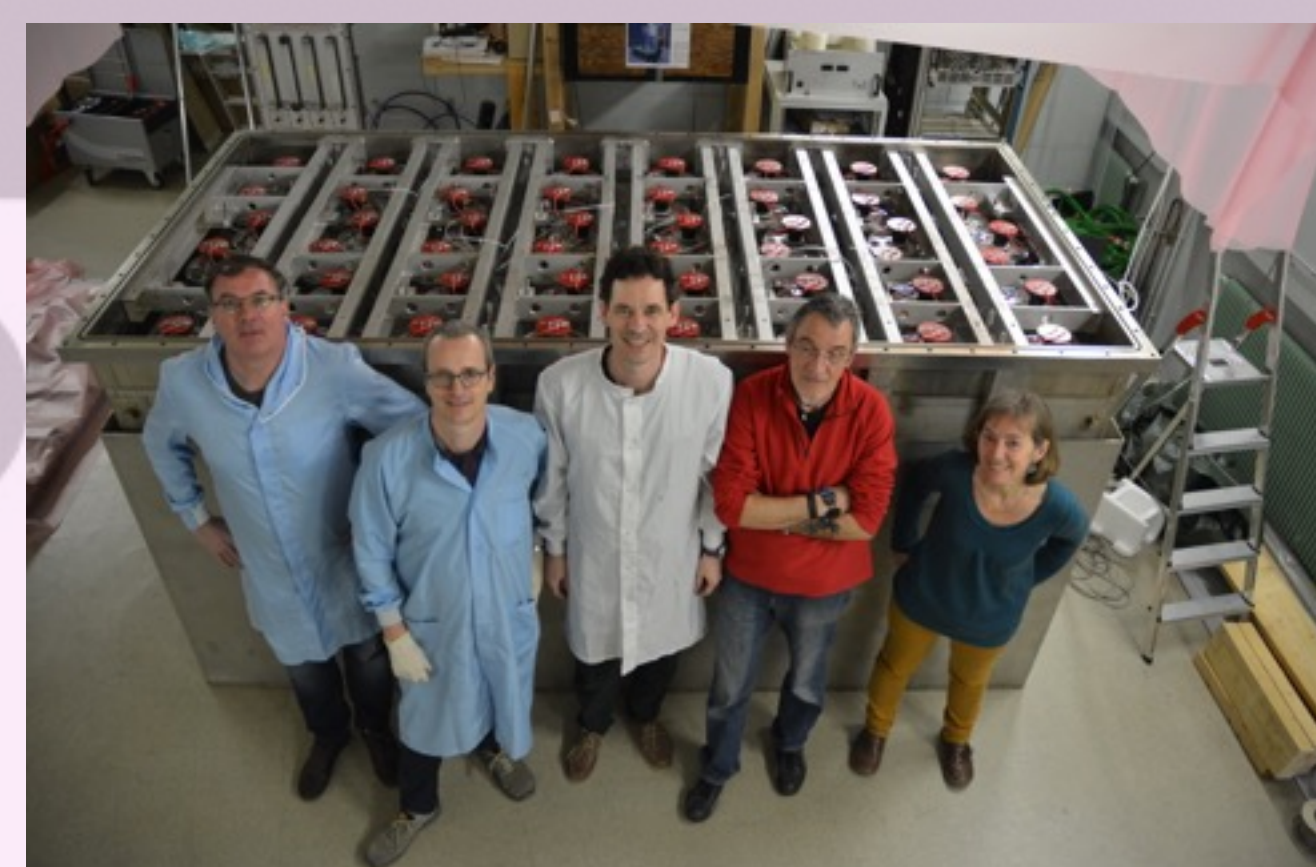


INSTALLATION PHASE

- Detector component now fully integrated
 - External steel vessel
 - Buffers equipped with four 8" PMT's each
 - Internal vessel made of VM2000-acrylic sandwiches: $\sim 100\%$ internal reflectivity @ all angles



- Stereo is in ILL and waits for filling, first data are foreseen for this autumn



DISCOVERY POTENTIAL

- Stereo aims to cover the reactor anomaly region in the first year of data taking [2]
- Also new reference ν measurement of pure ^{235}U ν spectrum

