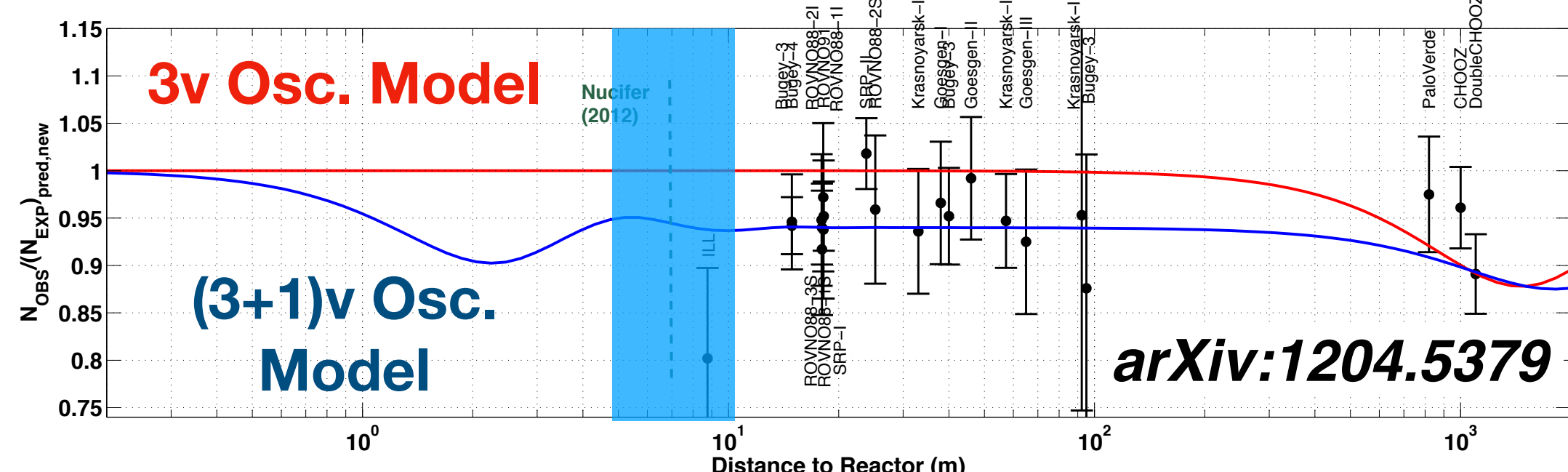


PROSPECT: Latest results for Sterile Neutrino Oscillation search

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on behalf of the PROSPECT collaboration
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Reactor Antineutrino Anomaly (RAA)



- World average observed flux shows **6% deficiency** with respect to theoretical predictions.
- The prediction models are based on Huber+Mueller and by 3-flavor neutrino oscillations at the distance of each experiment.

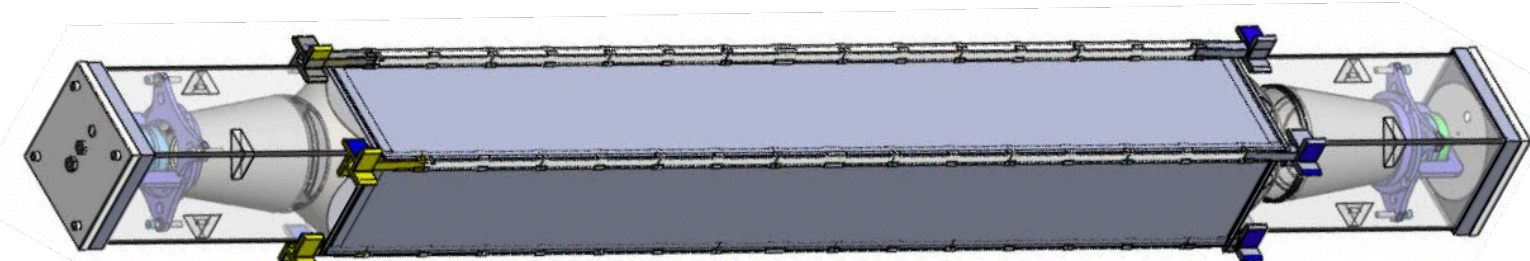
Where this global deficit is coming from?

- Reactor model predictions are not good enough
- Sterile Neutrinos:**
 - high frequency oscillations (~meter baselines).
 - eV-scale mass splitting.

RAA best-fit point at $\sin^2 2\theta = 0.165$, $\Delta m^2 = 2.39$

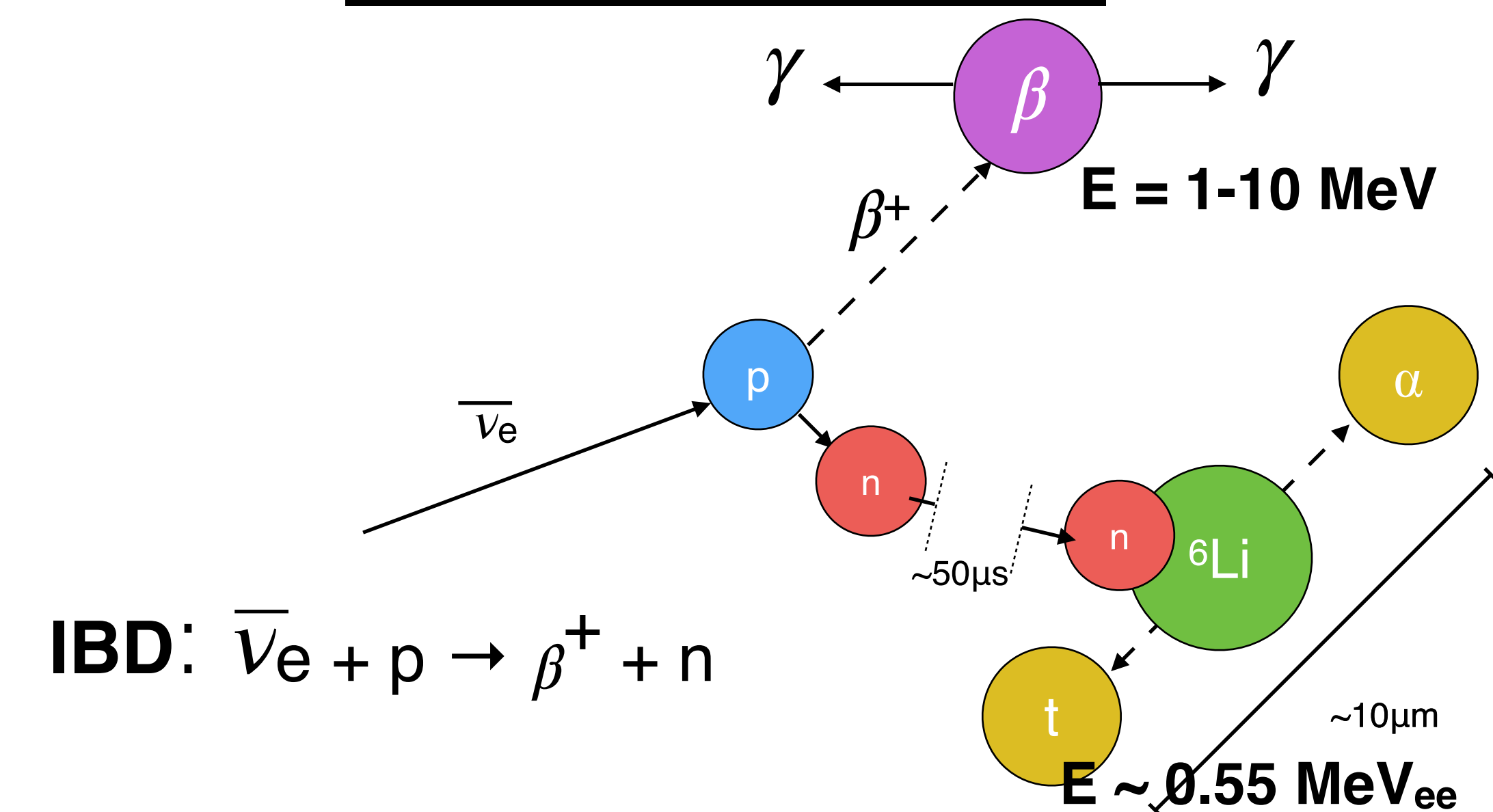
Segmented Detector

- Located the highly enriched High Flux Isotope Reactor (HFIR) at Oak Ridge National Laboratory
- ~3,000 L 6Li-loaded fiducial volume.
- 11 x 14 array** of optically separated segments.
- Double ended PMT readout, with light concentrators.
- Good light collection and energy response $\sim 4.5\text{-}5\% \sqrt{E}$ energy resolution.
- Full X,Y,Z event reconstruction.

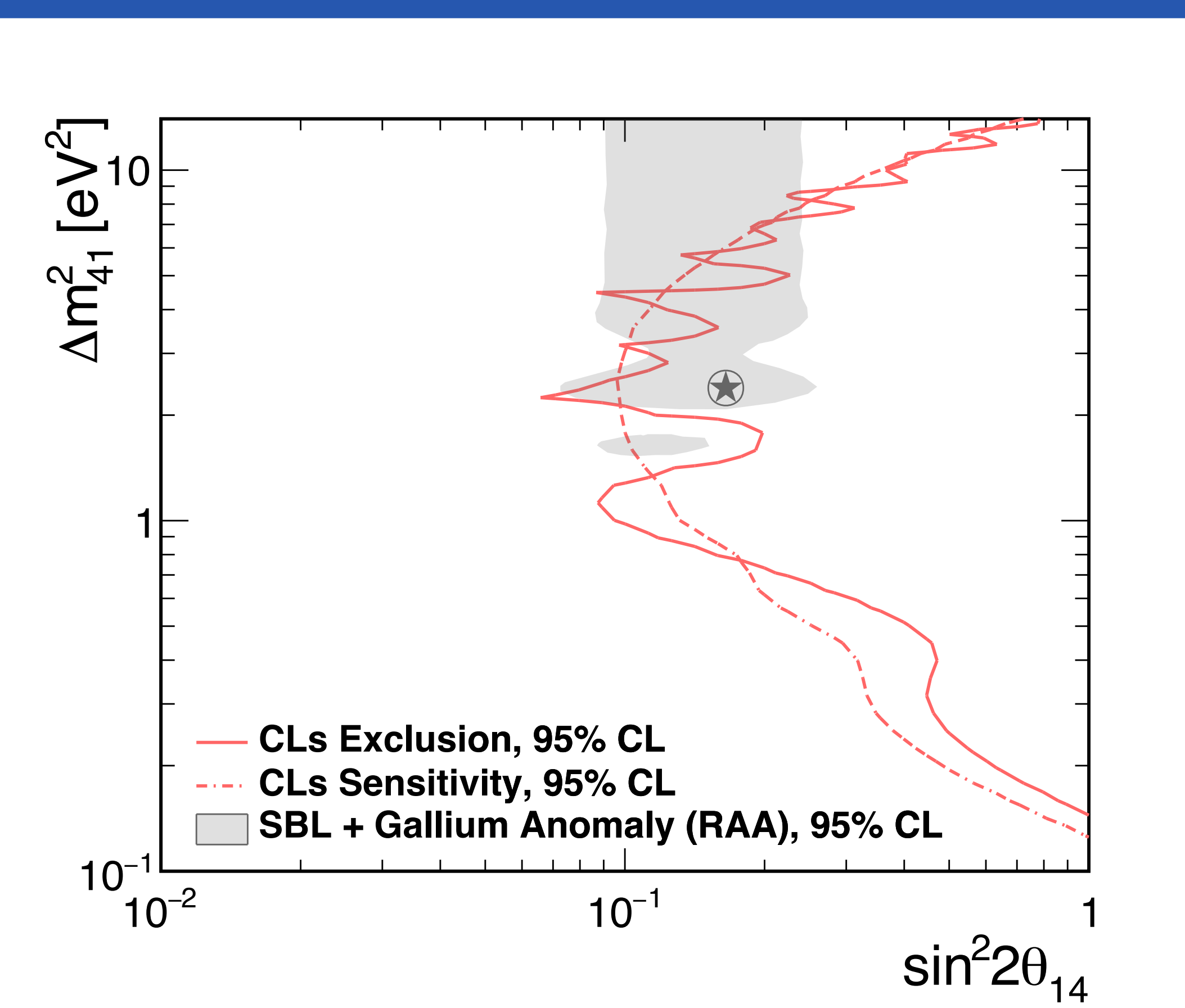


154 individual detectors

Inverse Beta Decay

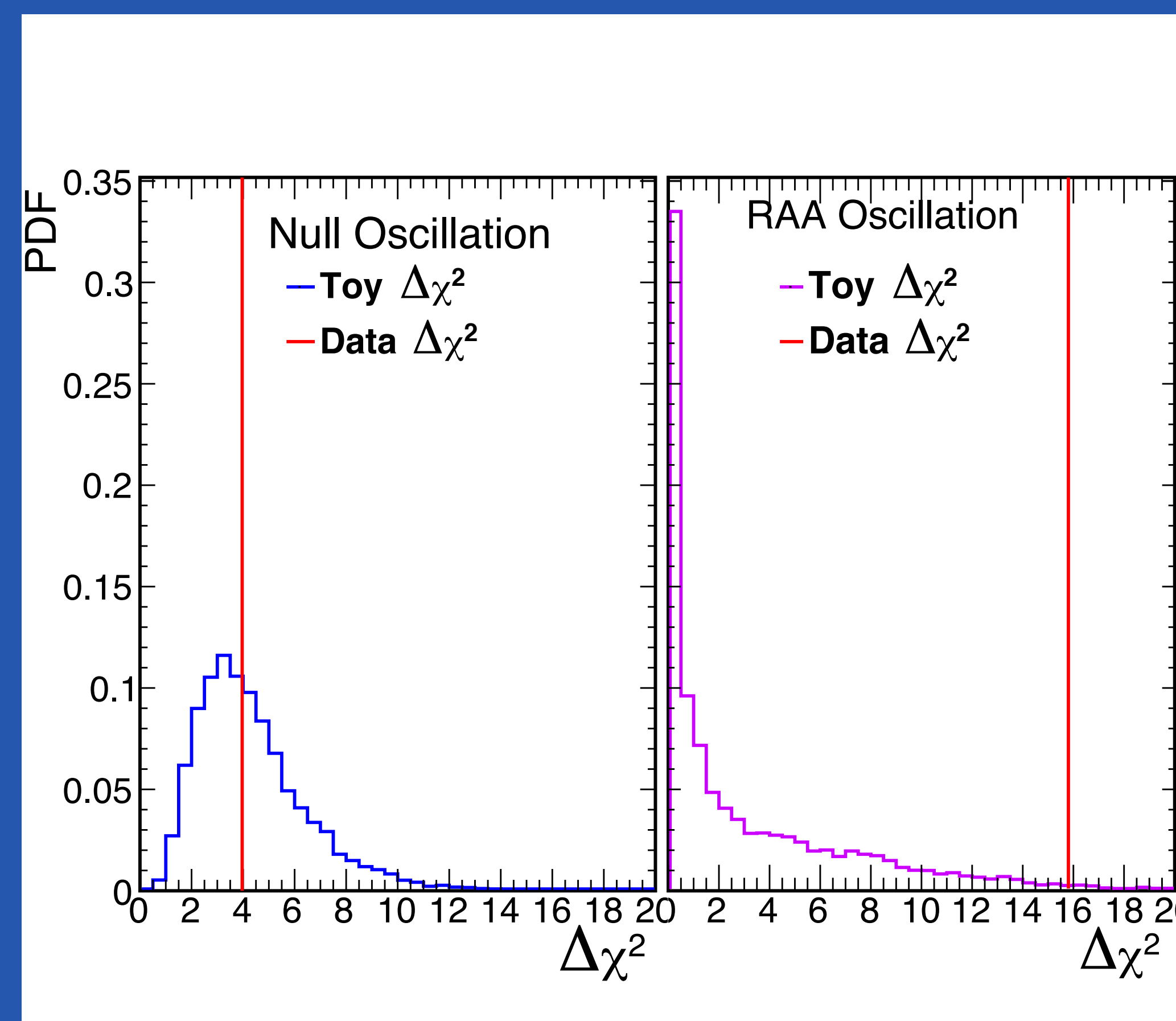


Latest Oscillation Result disfavors Reactor Antineutrino Anomaly best fit point by 2.5 sigma.



- 96 calendar days of data taken
- 85 MW HFIR core
- Average baseline 7.9 m
- 50K IBD interactions

Frequentist-derived oscillation exclusion contour is consistent with the Gaussian CLs method.

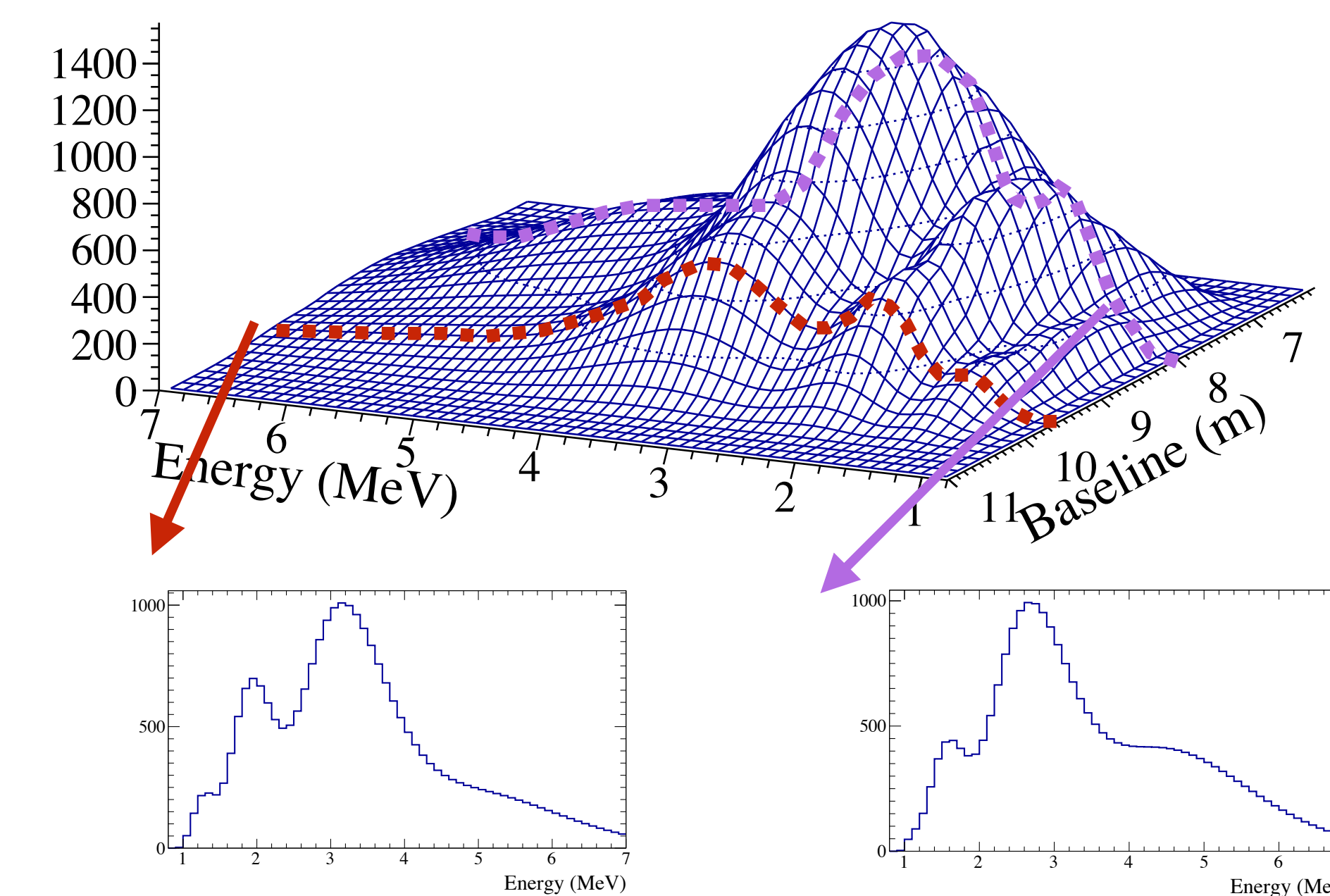


Prospect Latest Results

Check out these other PROSPECT posters:

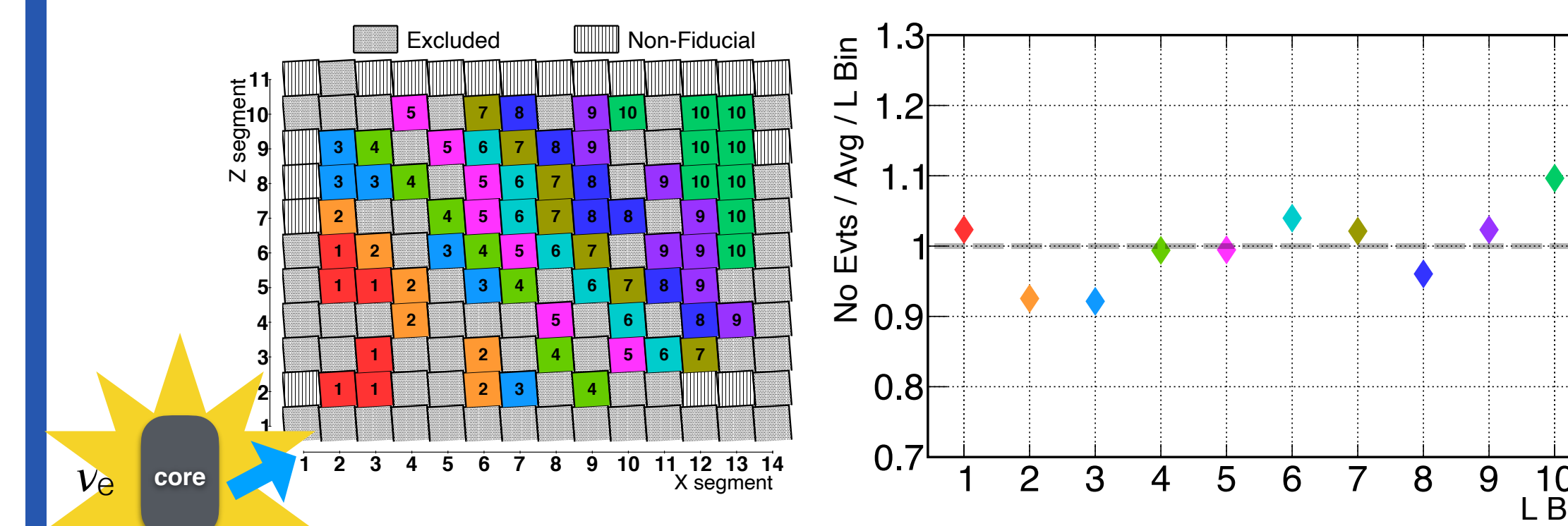
- ID 158: Updated Event Selection for the PROSPECT Experiment.
- ID 516: Measurement of the Uranium-235 Antineutrino Spectrum by PROSPECT.
- ID 527: Detector characterization and calibration for PROSPECT.
- ID 540: PROSPECT upgrade and science goals.
- ID 556: Towards a Joint Measurement of the 235U Reactor Antineutrino Spectrum by the Daya Bay, PROSPECT, and STEREO Experiments.

L,E Oscillated

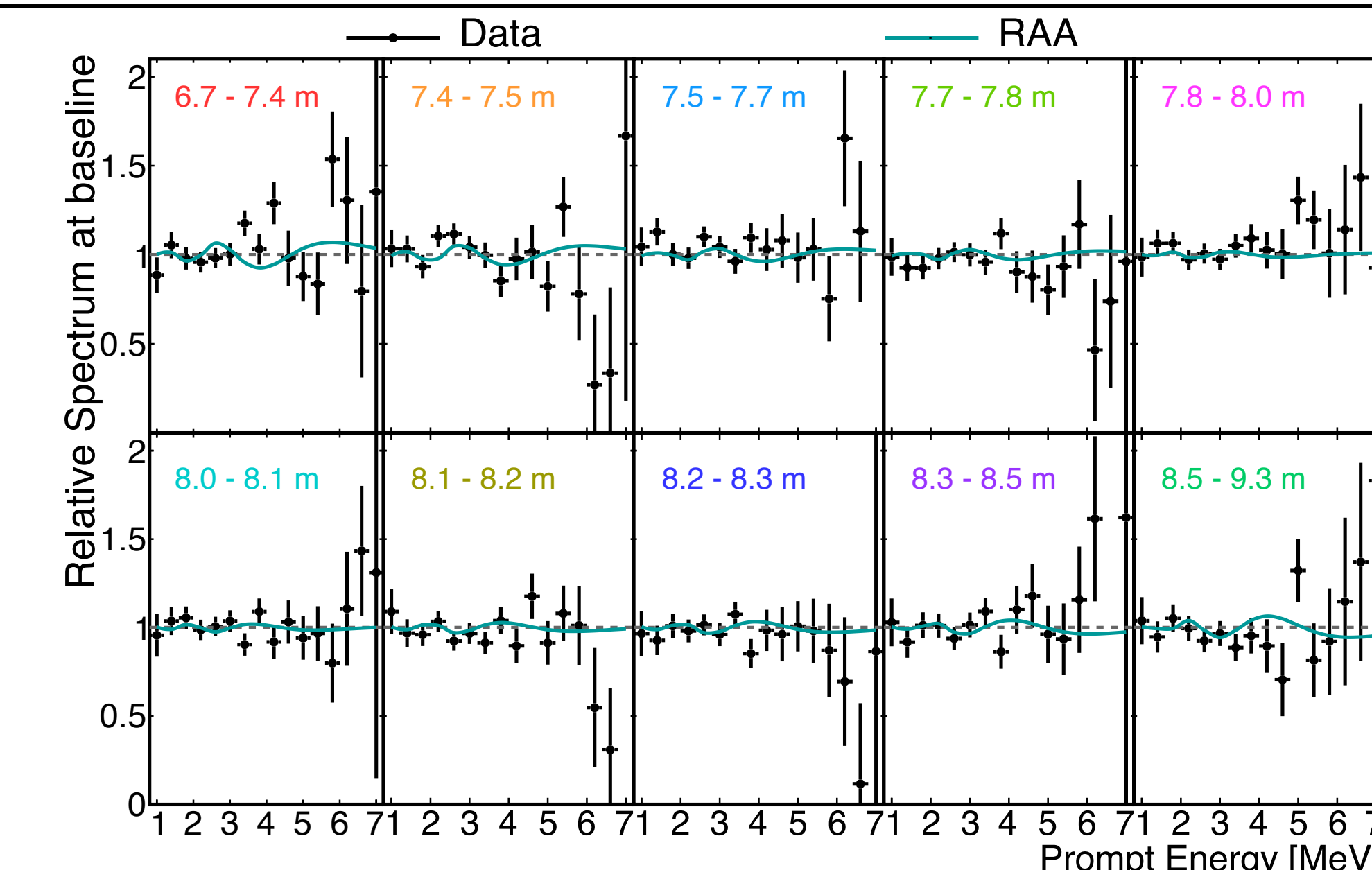


- Oscillations modify energy spectrum as a function of baseline
- $$P_{a \rightarrow b} \sim \sin^2(2\theta_{ab}) \sin^2\left(1.27 \frac{\Delta m_{ab} L}{E}\right)$$
- Relative comparison of segment spectrum shape to full detector spectrum, no reliance on reactor models

Baseline binning



10 baseline selected based on even statistics (10% var.)



Measured prompt Erec spectrum ratios (10 baseline bins).

Acknowledgements

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