

NOvA Neutrino + Antineutrino Analysis

Scientific Achievement

Large-scale analysis campaigns carried out at NERSC for the first time, in support of the first set of electron antineutrino appearance results shown June 4th at the Neutrino 2018 conference

Significance and Impact

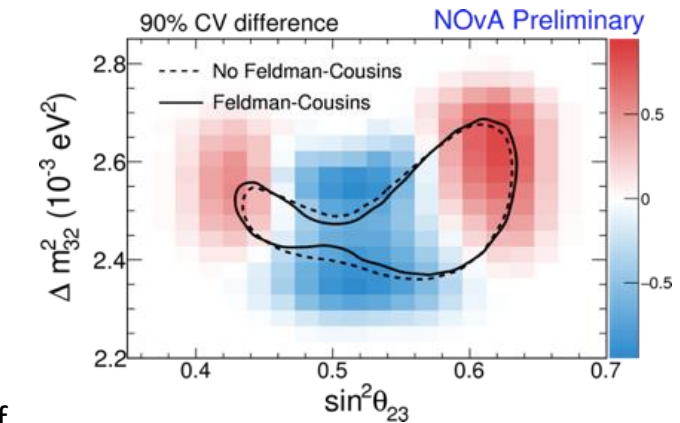
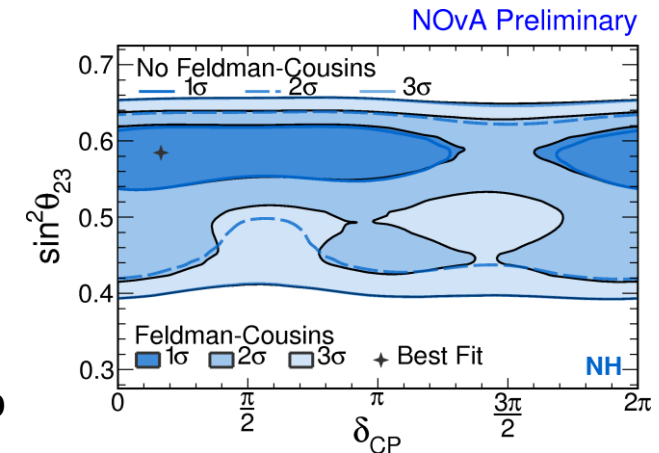
Most precise measurement of antineutrino oscillations to date; Improved accuracy: 8x higher resolution than any prior NOvA result; 50x faster than any previous result: reviewed by collaboration in <24h

Research Details

- Comparing data with neutrino oscillation hypothesis to extract best-fit oscillation parameters and associated confidence intervals.
- Employs new fitting procedures, some of the most complicated currently used in neutrino physics.
- Requires advanced statistical treatment to account for non-gaussianity of errors in oscillation measurements due to: (1) Low statistics; and (2) parameters probed near physical boundaries
- Statistical treatment is extremely computationally-intensive, requiring billions of simultaneous multi-dimensional fits

A.Sousa. Presented at CHEP 2018, Sofia, Bulgaria. To be published in EPJ Web of Conferences (2019).

<http://news.fnal.gov/2018/07/fermilab-computing-experts-bolster-nova-evidence-1-million-cores-consumed/>



Sensitivity contours under the Gaussian statistical assumptions compared to a Feldman-Cousins corrected computation. Corrected contours reveal large islands in parameter space where sensitivity is greatly improved.