



NOvA Anti-Neutrino Result Fits on NERSC

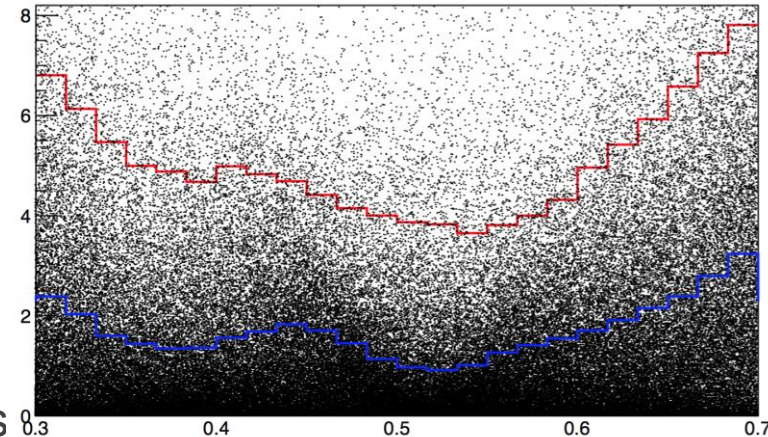
A.Norman (FNAL), A.Sousa (Cincinnati), N.Buchanan (Colorado State),
J.Kowalkowski (SciDAC-PI), B.Holzman (HEPCloud-PI)

NOvA, SciDAC-4, HEPCloud



- *NOvA will be revealing first set of electron anti-neutrino appearance results on June 4th*
- **Large-scale analysis campaigns carried out at NERSC Cori for the first time**
 - First run occurred on May 7th
 - Second round of calculations will occur on May 24th (both Cori and Edison)
 - Will be requesting an addition 40-50M hours
 - New facilities and procedures enthusiastically received by NOvA collaboration – desire accelerating transfer of other key analyses
- **Some of the most complicated fitting procedures in neutrino physics**
 - Simultaneous multi-dimensional fits for neutrino and anti-neutrino data
 - Complexity of high dimensional parameter space requires billions of functional fits
 - Multi-Universe techniques utilized for proper statistical correction

Multi-Universe Corrections for Fit of θ_{23}



Feldman-Cousins pseudo-experiments corrections of neutrino/anti-neutrino fits for θ_{23} . Includes 1σ (blue) and 2σ (red) correction curves.

Project support

- Required coordinated effort from SciDAC-4, Fermilab, the NOvA collaboration, and NERSC staff.
- **SciDAC-4 HEP on HPC**
 - This work completes the first year major milestones:
 - reproduced 2017 results for validation and
 - formed baseline for analysis calculations with current data, providing major scientific results
 - All future HPC refactoring will be compared with this result.
 - Analysis and technical effort directed by SciDAC/NOVA laboratory and university Postdocs and students
 - Provided excellent training ground for utilizing HPC centers and tools
- **Fermi HEPCloud**
 - Enabled large-scale resource provisioning, workload management, and monitoring at NERSC
- **Broke several records**
 - Accuracy: 8x higher resolution than any prior result
 - Turnaround: 50x faster - results reviewed in <24 hours!
 - Scale: ~1M active cores – biggest Condor pool ever!



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