

Citations

- [1] PRL 134, 081804
- [2] PRD 79, 072002
- [3] arXiv:2602.11345 [hep-ex]

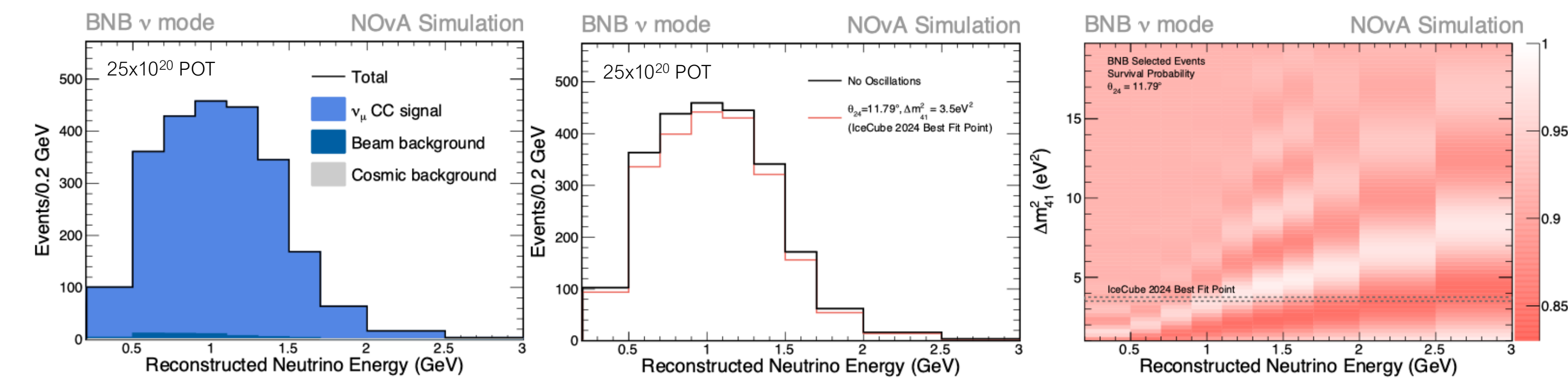
Acknowledgement

We would like to thank the MiniBooNE collaboration for access to their flux files, and to MiniBooNE computing nodes

This poster was prepared by the NOvA Collaboration using the resources of the Fermi National Accelerator Laboratory (Fermilab), a U.S. Department of Energy, Office of Science, Office of High Energy Physics HEP User Facility. Fermilab is managed by Fermi Forward Discovery Group, LLC, acting under Contract No. 89243024CSC000002.

Data Selection

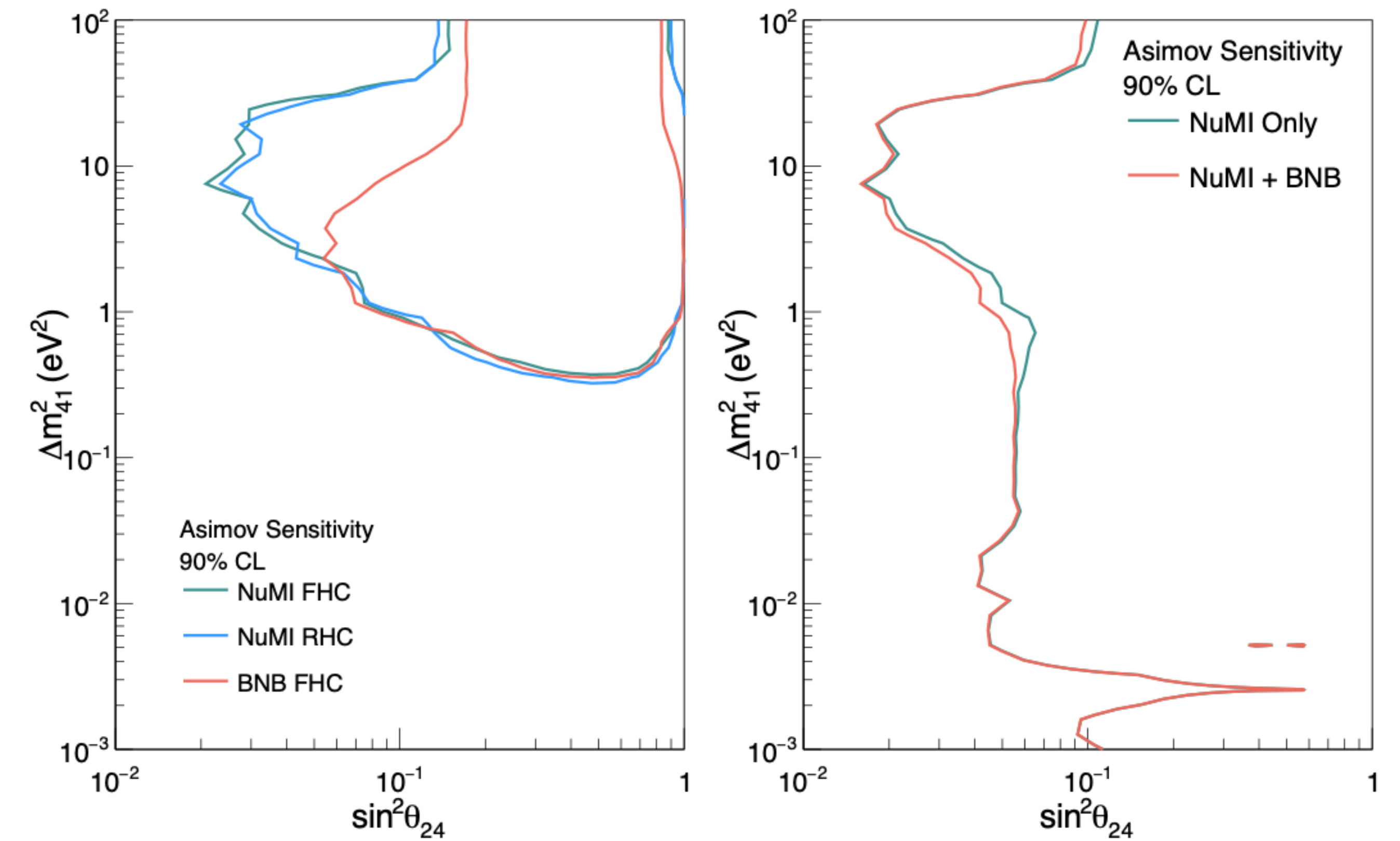
ν_μ selections require **good quality reconstruction, selected for neutrino flavour by a CVN, and split into contained and uncontained samples**



Very little NC/ ν_e contamination
Oscillations visible around IceCube 2024 Best Fit point
At higher Δm_{41}^2 , oscillations begin to average out at lower energies

Sensitivity Improvement

Compare sensitivity of **ND Samples** Full sensitivity improvement



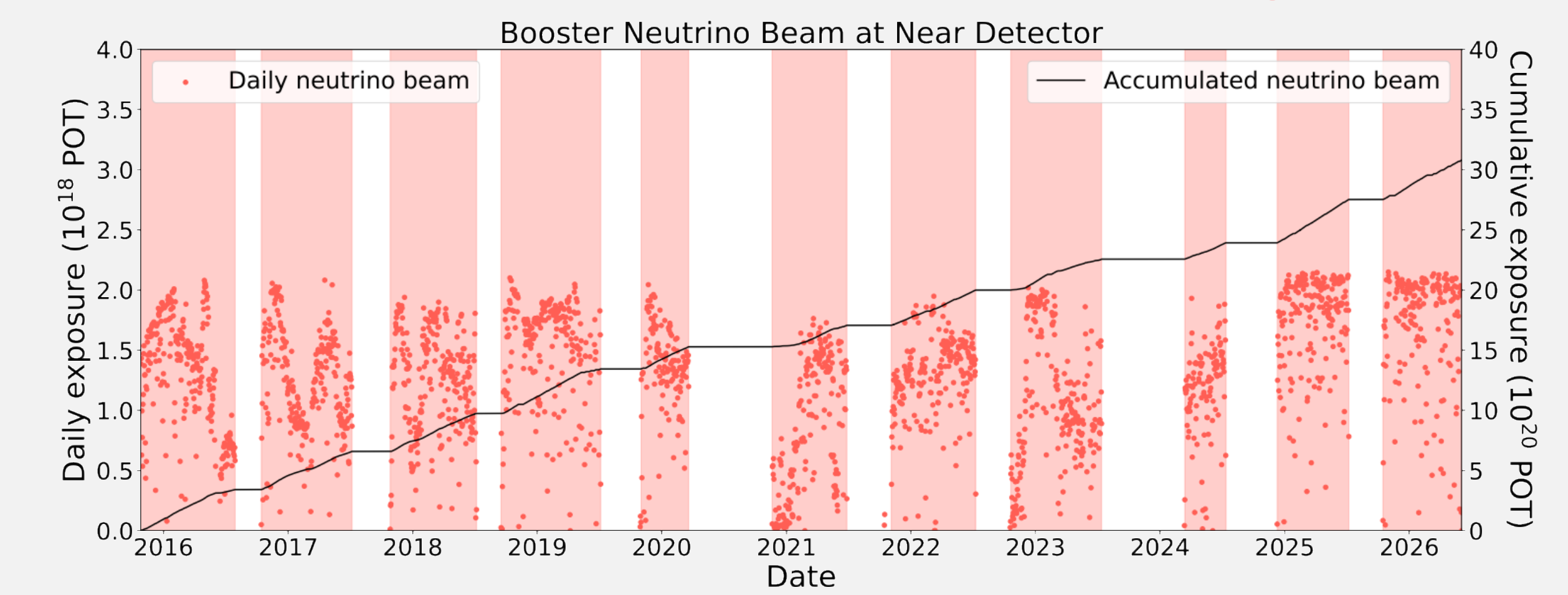
At lower values of Δm_{41}^2 the **BNB** dataset is as powerful as **NuMI** datasets
initial studies show it could improve our limit by around 30%^[3]

Summary

The NOvA Near Detector can see neutrinos from the Booster Neutrino Beam, and this data can be used to improve our sterile neutrino search

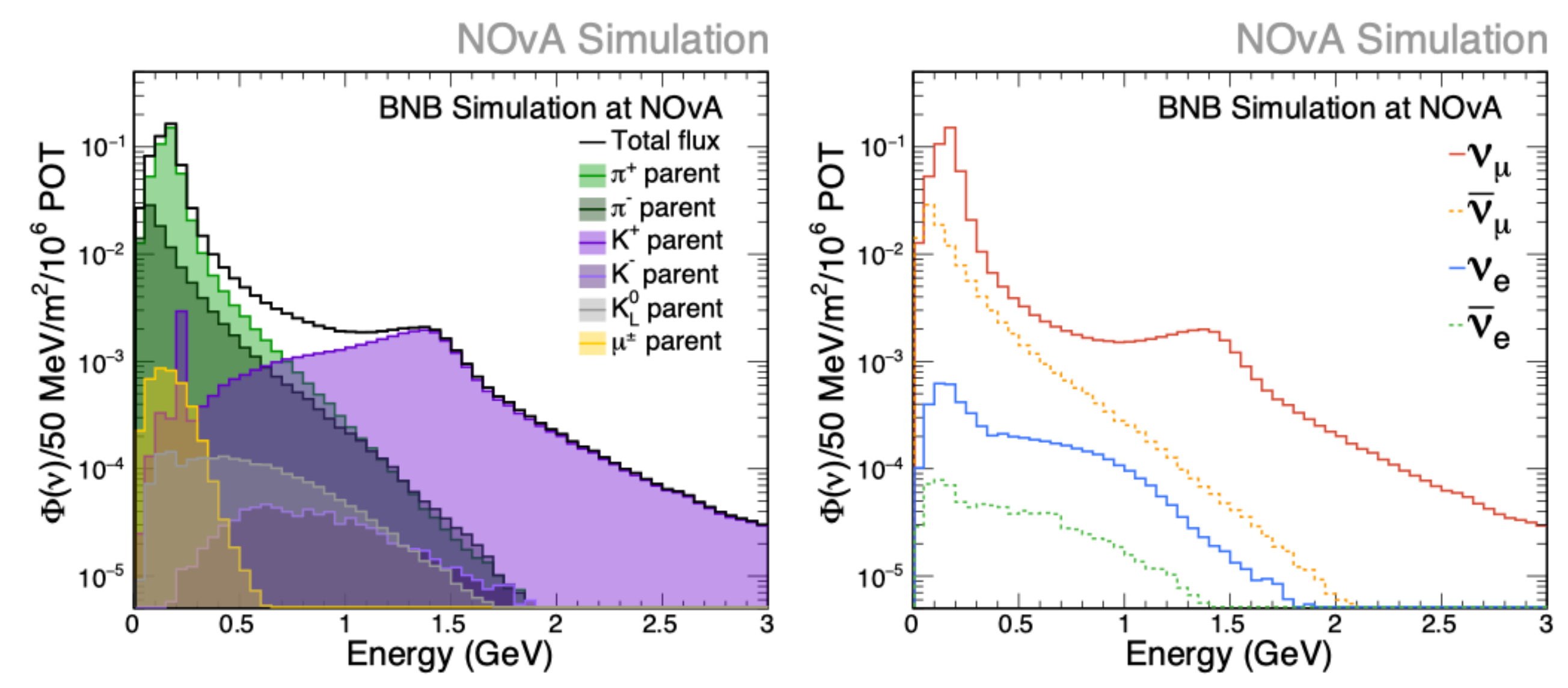
The Booster Neutrino Beam

The NOvA ND has collected **>30x10²⁰ POT** since data taking started in 2015



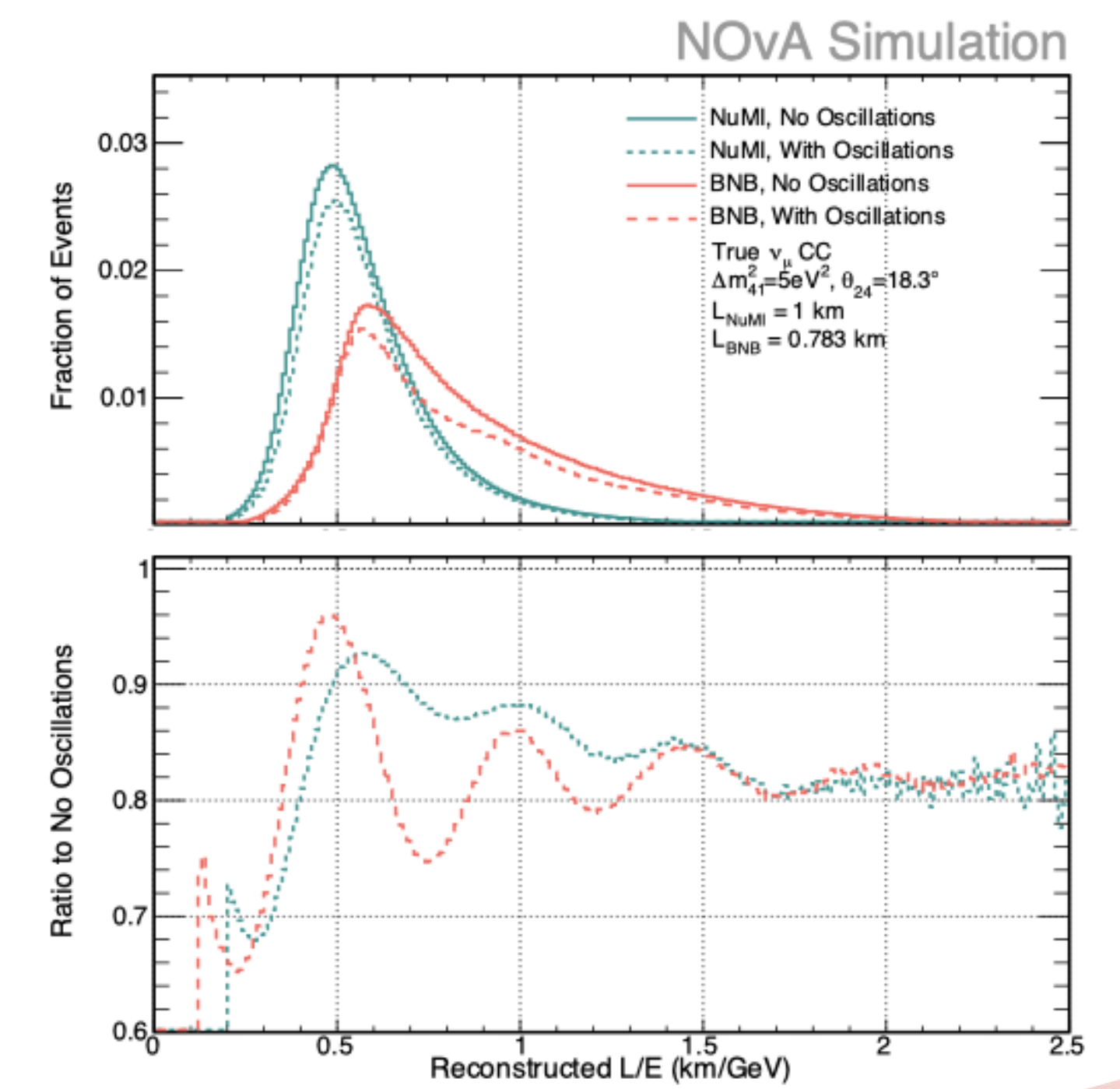
	Protons per pulse	Rep rate (Hz)	Proton energy (GeV)	Off-axis angle (°)	Baseline (km)
NuMI	5×10^{13}	< 1	120	0.8	~1.0
BNB	5×10^{12}	5	8	9.24	~0.78

The BNB flux at NOvA was simulated from original MiniBooNE flux files^[2]

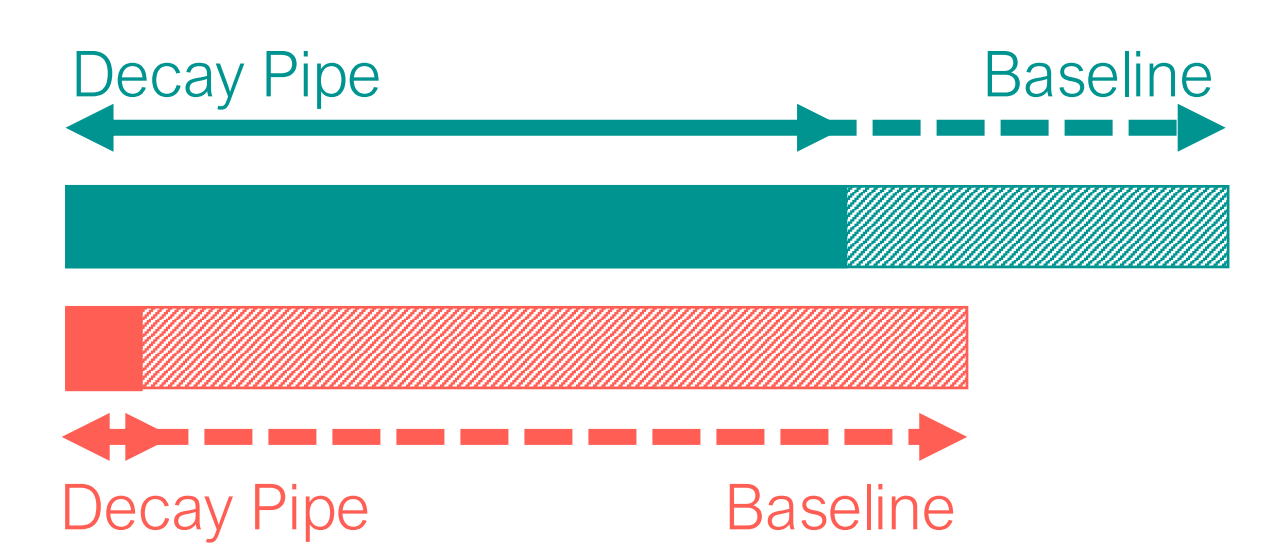


BNB and NuMI datasets have correlated interaction and detector uncertainties, uncorrelated beam uncertainties.

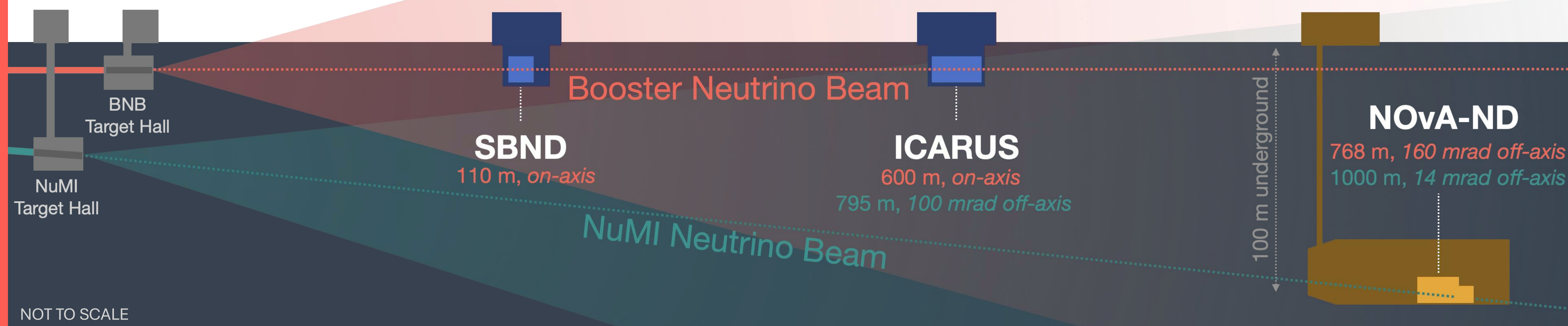
Similar L/E & different E: break degeneracy in oscillations and uncertainties!



BNB decay pipe ~ 50 m,
NuMI decay pipe ~ 675 m



There is **less uncertainty on L**, and so **oscillations appear sharper** in the **BNB** than in **NuMI**



NOT TO SCALE

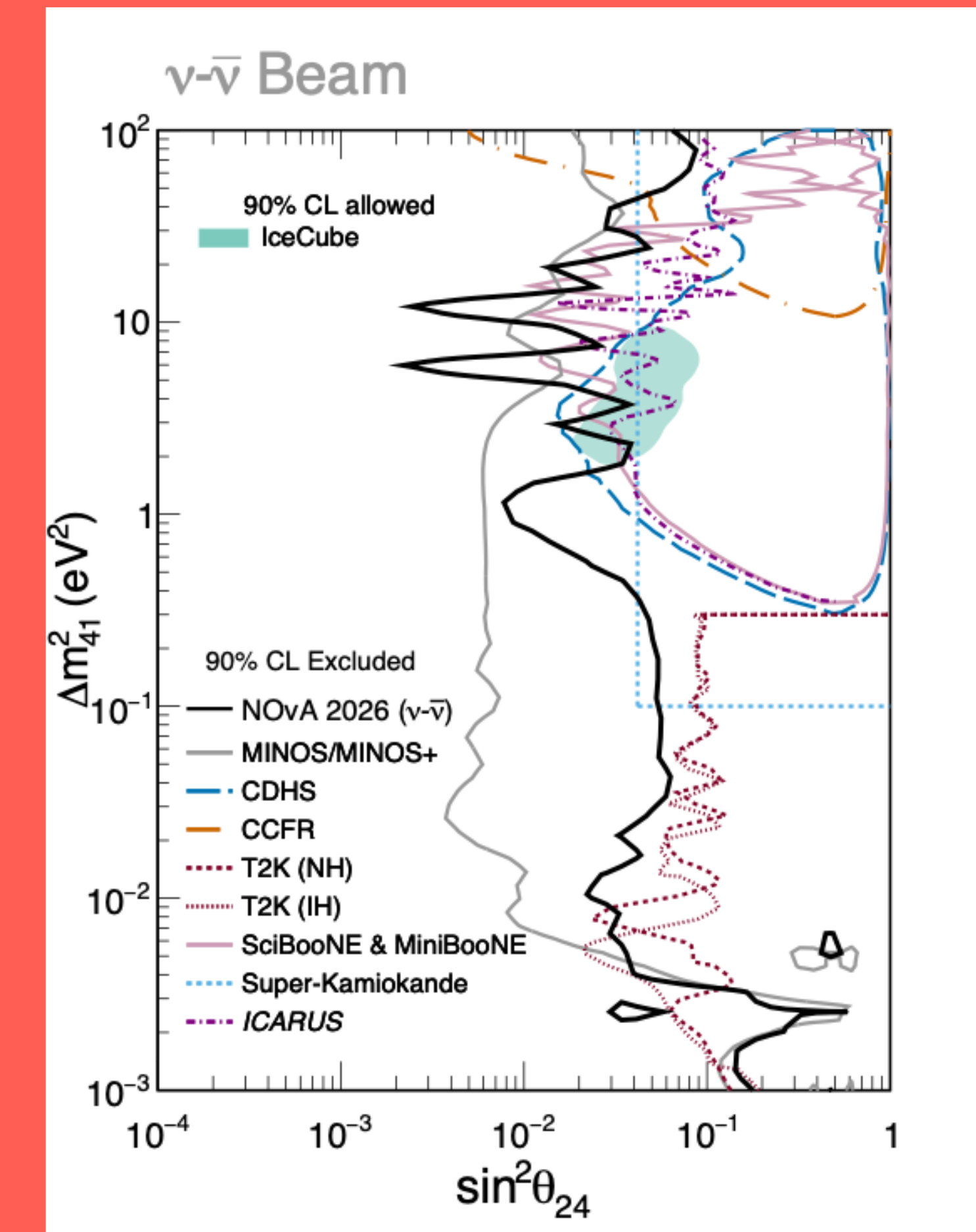
Future Sterile Neutrino Searches in NOvA using the Booster Neutrino Beam

FERMILAB-POSTER-26-0038-PPD

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NOvA's Sterile Neutrino Searches

We have world-leading limits in several regions of parameter space
See Shivam's poster (#195)



NC and ν_μ disappearance
NuMI beam
Joint analysis across
Near (L~1 km) and Far (L~810 km) Detectors^[1]

Improving Our Limits

Comprehensive strategy to improve limits!

Improving our L/E resolution
See Jessica's poster (#206)

Including ν_e appearance channel
See Bishnu's poster (#21)

Additional samples for disambiguating oscillations and systematic effects
This poster!

@novaexperiment

