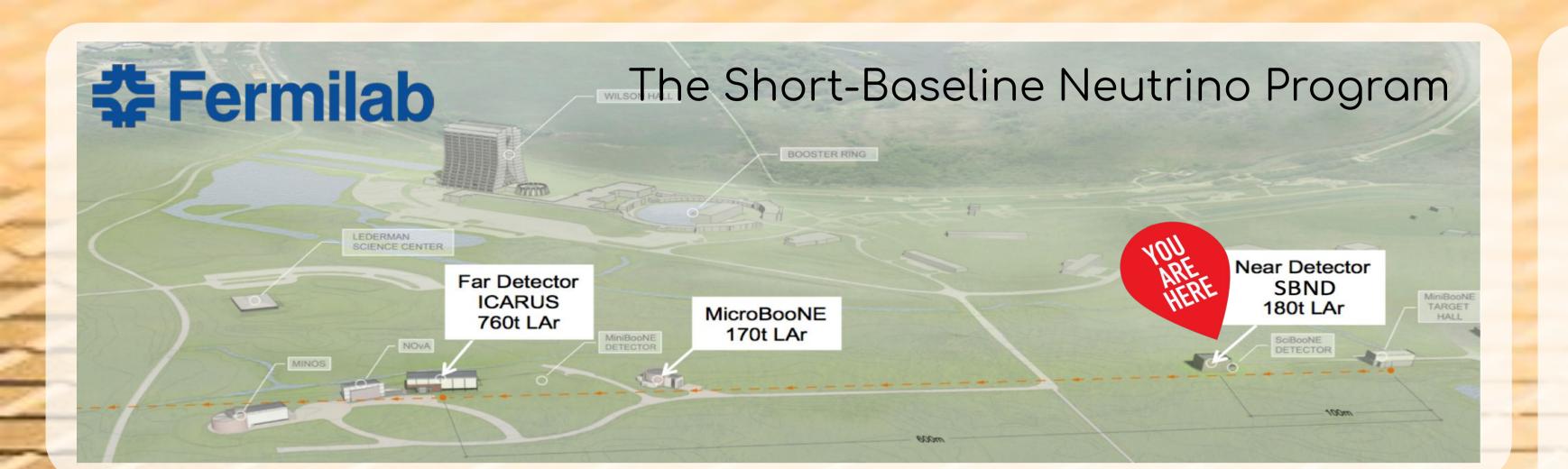


Status of the Short-Baseline Near Detector at Fermilab

G. A. Valdiviesso on behalf of the SBND Collaboration gustavo.valdiviesso@unifal-mg.edu.br

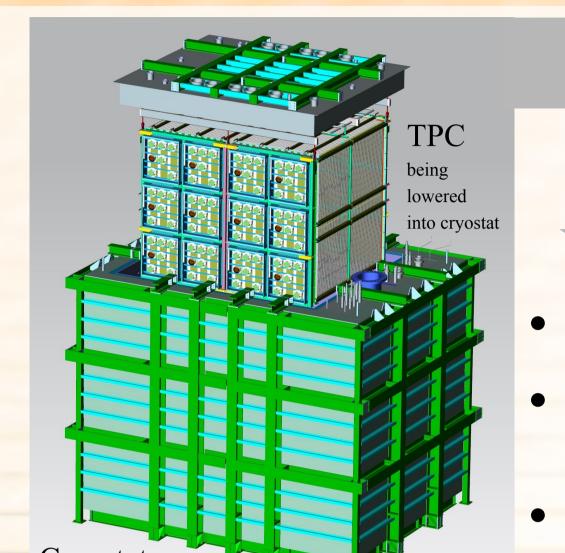


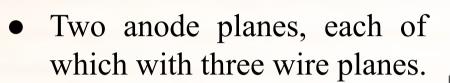




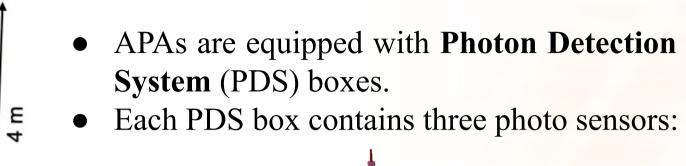
SBND in a nutshell

- A Time Projection Chamber (TPC) containing 111,6x10³ kg of liquid argon as a neutrino target
- Located at 110m from Fermilab's Boost Neutrino Beam (BNB) target.
- As part of the SBN program, it will look for muon-neutrino disappearance as well as electron-neutrino appearance in the BNB's muon-neutrino beam addressing the puzzle of the short-baseline neutrino anomaly.
- Its standalone physics program include neutrino-argon cross-section measurements, Beyond Standard Model (BSB) searches, as well as potential for Supernova observations.

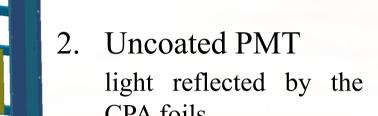




- One central cathode plane, CPA lined with wavelength-shifter coated foils.
- A uniform cathode-to-anode electric field (500V/cm) surrounded by a field cage.







direct scintillation light

ARAPUCA

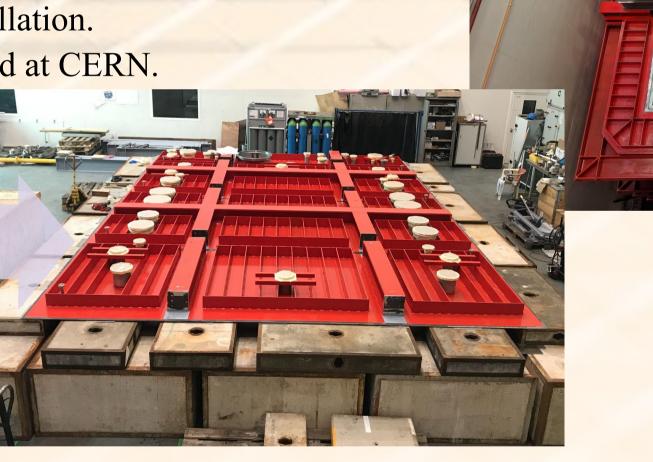
Installation Status

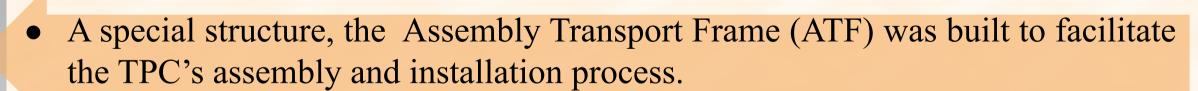
Most recently:

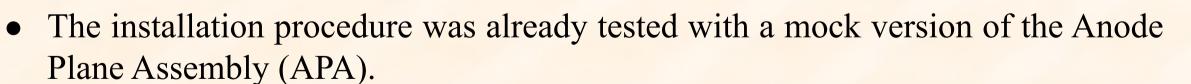
- Cryostat external structure already in place.
- Internal wall flatness and dimensions measured.

Up next:

- Membrane cryostat, internal and external cryogenics.
- Top cap assembly and installation.
- The the top cap is assembled at CERN.





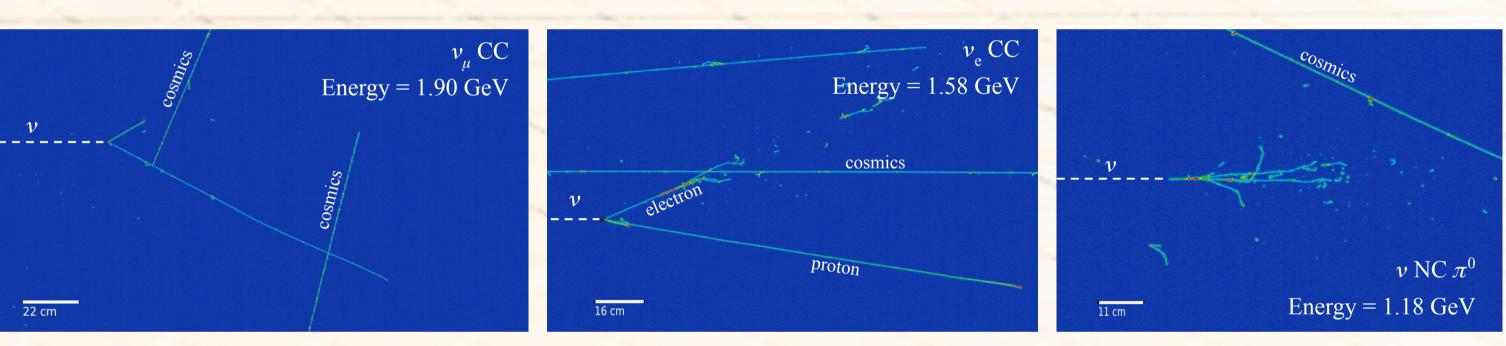




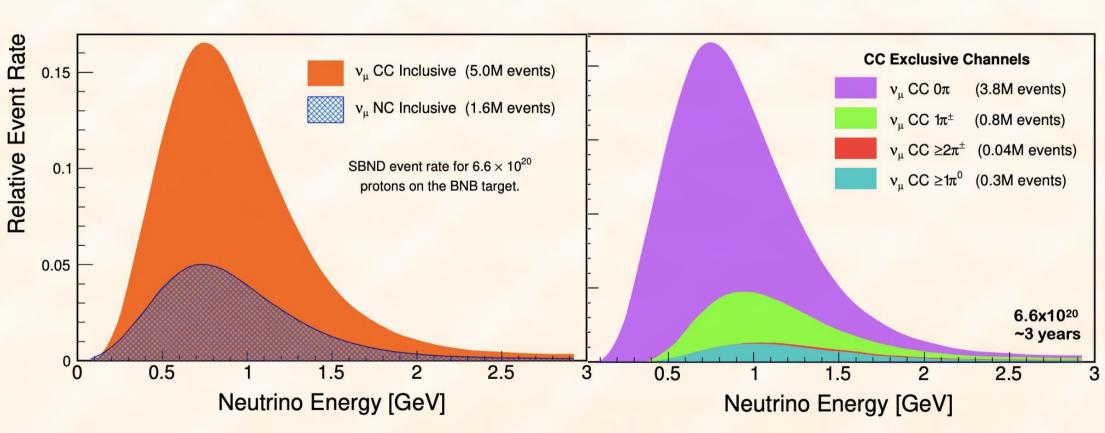
• In the next few months, there will be a TPC inside this ATF



Physics and Simulation



Recent MC production: high statistics samples of BNB's v_{μ} and v_{e} , and cosmics.

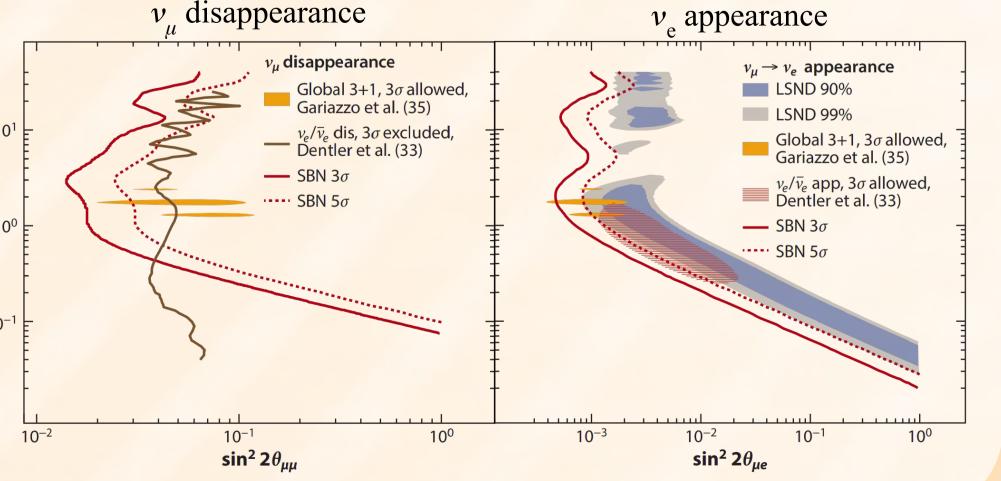


Expecting an unprecedented **6.6 million** neutrino interactions to 6.6×10^{20} corresponding protons-on-target (delivered in approximately 3 years), of which about 3:4 from charged current (CC) and 1:4 from neutral current (NC) events.

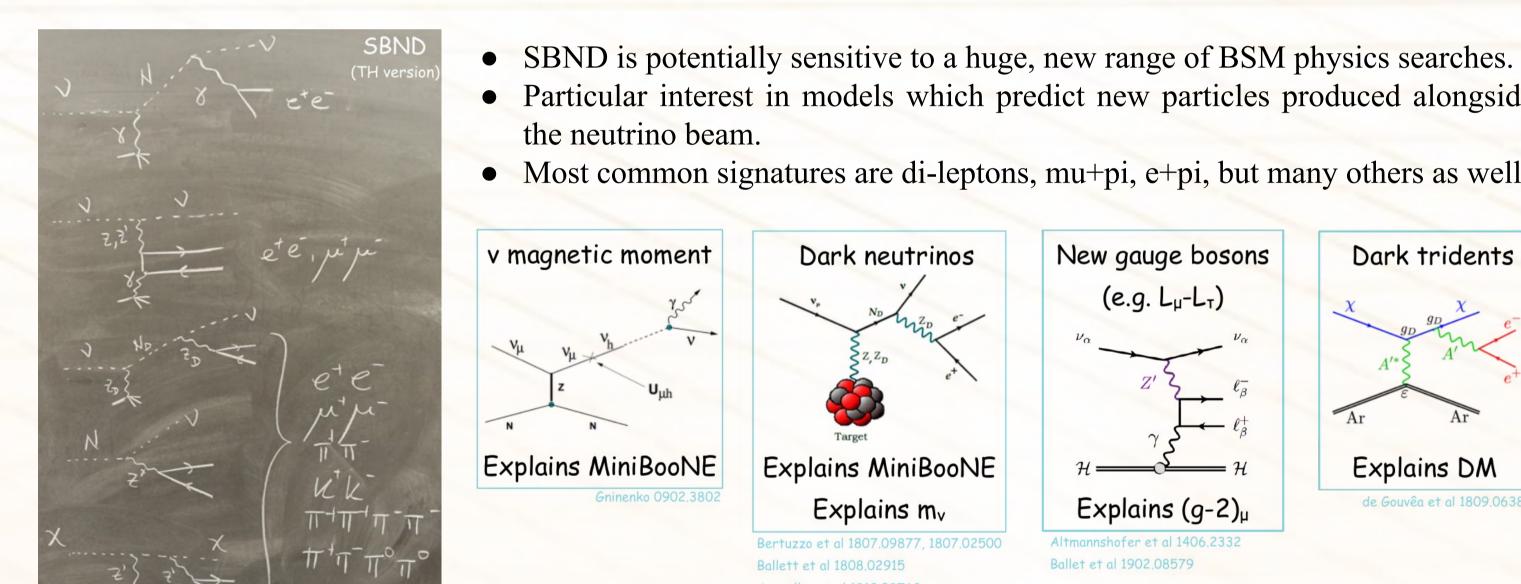
CC events distribution over the ost frequent final-state topologies.

Employing three fitting frameworks allowing for detailed validation and cross-checking. These are fed with common inputs, but are independentlydeveloped by other collaborations: CAFAna (by Nova and DUNE), SBNFit (by MicroBooNE) and VALOR (by T2K).

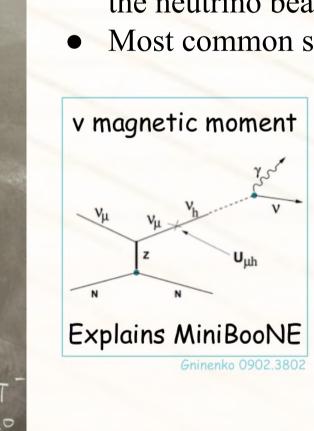
Sensitivity to v_{μ} disappearance and v_{μ} appearance in a 3+1 model.

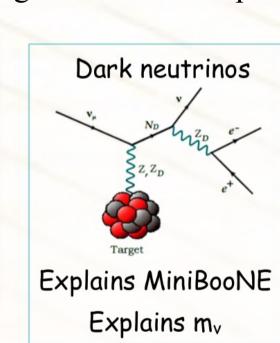


Beyond Standard Model Searches



- Particular interest in models which predict new particles produced alongside the neutrino beam.
- Most common signatures are di-leptons, mu+pi, e+pi, but many others as well.





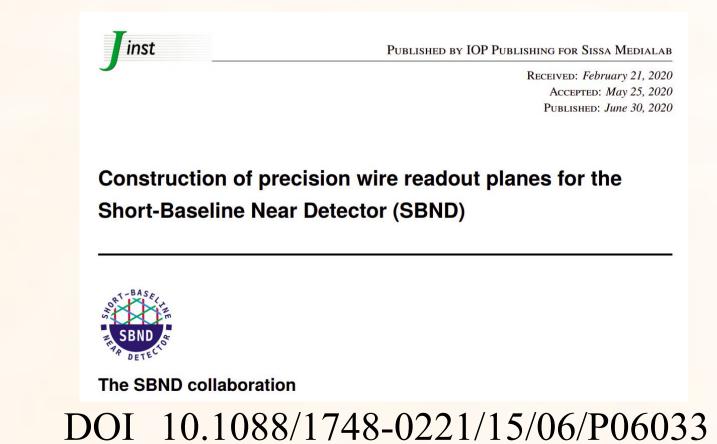
Dark tridents New gauge bosons (e.g. L_{μ} - L_{τ}) Explains DM Explains (g-2)_µ

Don't Miss Our Other Poster

A DAQ-Level Pure Neutrino Stream For SBND presented by Erin Yandel from UC Santa Barbara

A preliminary look at a DAQ-level 100% pure selection of neutrino events, to be used in the development and validation of calibration, monitoring, and analysis tools for SBND.

Recent Publications



Cosmic Background Removal with Deep Neural Networks in SBND

R. Acciarri¹⁵, C. Adams¹, C. Andreopoulos^{21,29}, J. Asaadi³⁴, M. Babicz⁶, C. Backhouse³⁵, W. Badgett¹⁵, L. Bagby¹⁵, D. Barker³⁰, V. Basque²³, M. C. Q. Bazetto^{4,5}, M. Betancourt¹⁵, A. Bhanderi²³, A. Bhat³², C. Bonifazi¹³, D. Brailsford²⁰, A. G. Brandt³⁴, T. Brooks³⁰, M. F. Carneiro³, Y. Chen², H. Chen³ G. Chisnall³¹, J. I. Crespo-Anadón⁸, E. Cristaldo²⁶, C. Cuesta⁸, I. L. de Icaza Astiz³¹, A. De Roeck⁶ G. de Sá Pereira^{21,29}, M. Del Tutto¹⁵, V. Di Benedetto¹⁵, A. Ereditato², J. J. Evans²³, A. C. Ezeribe³⁰ R. S. Fitzpatrick²⁴, B. T. Fleming³⁷, W. Foreman¹⁹, D. Franco³⁷, I. Furic¹⁶, A. P. Furmanski²⁵, S. Gao³, D. Garcia-Gamez¹⁷, H. Frandini⁴, G. Ge¹⁰, I. Gil-Botella⁸, S. Gollapinni^{22,33}, O. Goodwin²³, P. Green²³, W. C. Griffith³¹, R. Guenette¹⁸, P. Guzowski²³, T. Ham²¹, J. Henzerling²¹, A. Holin³⁵, B. Howard¹⁵ R. S. Jones²¹, D. Kalra¹⁰, G. Karagiorgi¹⁰, L. Kashur⁹, W. Ketchum¹⁵, M. J. Kim¹⁵, V. A. Kudryavtsev³⁰ J. Larkin³, H. Lay²⁰, I. Lepetic²⁸, B. R. Littlejohn¹⁹, W. C. Louis²², A. A. Machado⁴, M. Malek³⁰ D. Mardsen²³, C. Mariani³⁶, F. Marinho¹⁴, A. Mastbaum²⁸, K. Mavrokoridis²¹, N. McConkey²³ V. Meddage¹⁶, D. P. Méndez³, T. Mettler², K. Mistry²³, A. Mogan³³, J. Molina²⁶, M. Mooney⁹, L. Mora ²³ C. A. Moura¹¹, J. Mousseau²⁴, A. Navrer-Agasson²³, F. J. Nicolas-Arnaldos¹⁷, J. A. Nowak²⁰, O. Palamara¹⁵ —V. Pandev¹⁶, J. Pater²³, L. Paulucci¹¹, V. L. Pimentel^{4,5}, F. Psihas¹⁵, G. Putnam⁷, X. Qian³, E. Raguzin³ H. Ray¹⁶, M. Reggiani-Guzzo²³, D. Rivera²⁷, M. Roda²¹, M. Ross-Lonergan¹⁰, G. Scanavini³⁷, A. Scarff³⁰ D. W. Schmitz⁷, A. Schukraft¹⁵, E. Segreto⁴, M. Soares Nunes³², M. Soderberg³², S. Söldner-Rembold²³, J. Spitz²⁴, N. J. C. Spooner³⁰, M. Stancari¹⁵, G. V. Stenico⁴, A. Szelc²³, W. Tang³³, J. Tena Vidal²¹,

ArXiv 2012.01301

D. Torretta¹⁵, M. Toups¹⁵, C. Touramanis²¹, M. Tripathi¹⁶, S. Tufanli⁶, E. Tyley³⁰, G. A. Valdiviesso¹².

E. Worcester³, M. Worcester³, G. Yarbrough³³, J. Yu³⁴, B. Zamorano¹⁷, J. Zennamo¹⁵, and A. Zglam³⁰