

Could SBND-PRISM probe Lepton Flavor Violation?



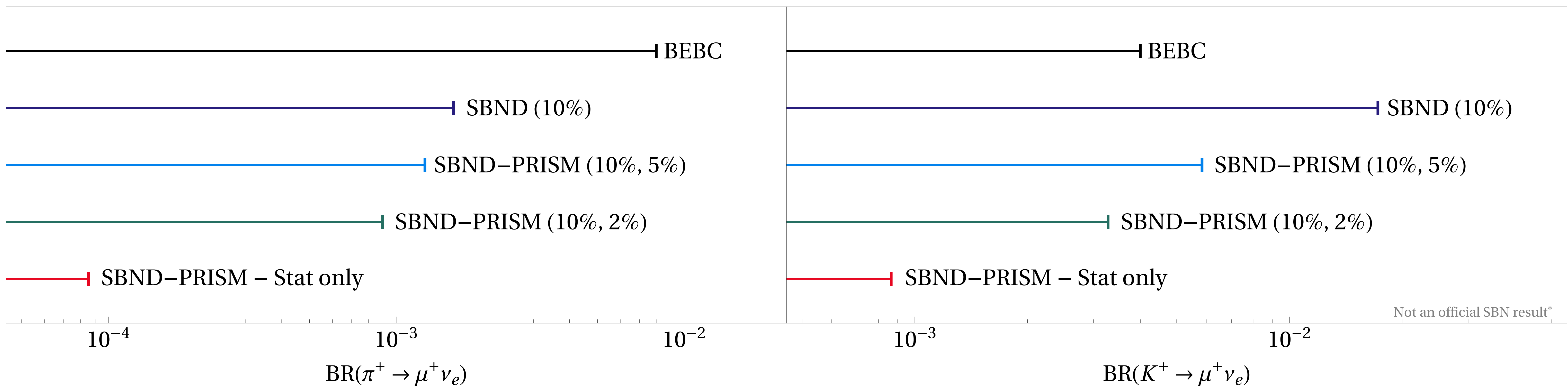
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$$\pi^+ \rightarrow \mu^+ \nu_e$$

$$K^+ \rightarrow \mu^+ \nu_e$$



Main Question

Can we probe lepton flavor violation with neutrinos beyond oscillations?

Main Idea

Neutrino experiments produce several neutrino events, this gives us information about the flavor composition at the source.

Caveat

Neutrinos oscillate and experiments are designed to probe this phenomenon which is intrinsically flavor violating and can mask LFV at source.

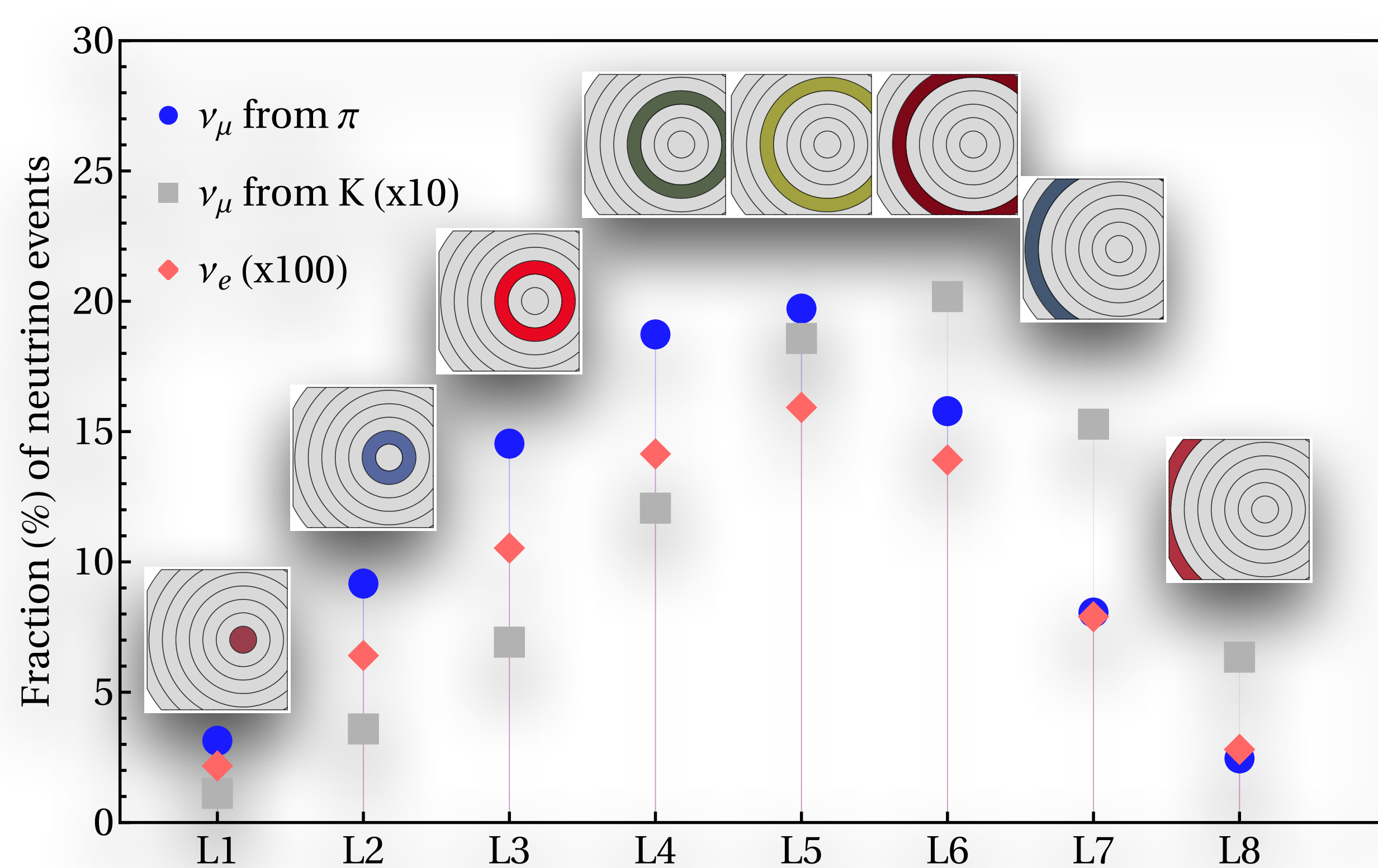
Requirements:

- Very short baseline.
- High statistics of CC events.
- Low background of intrinsic electron neutrinos.

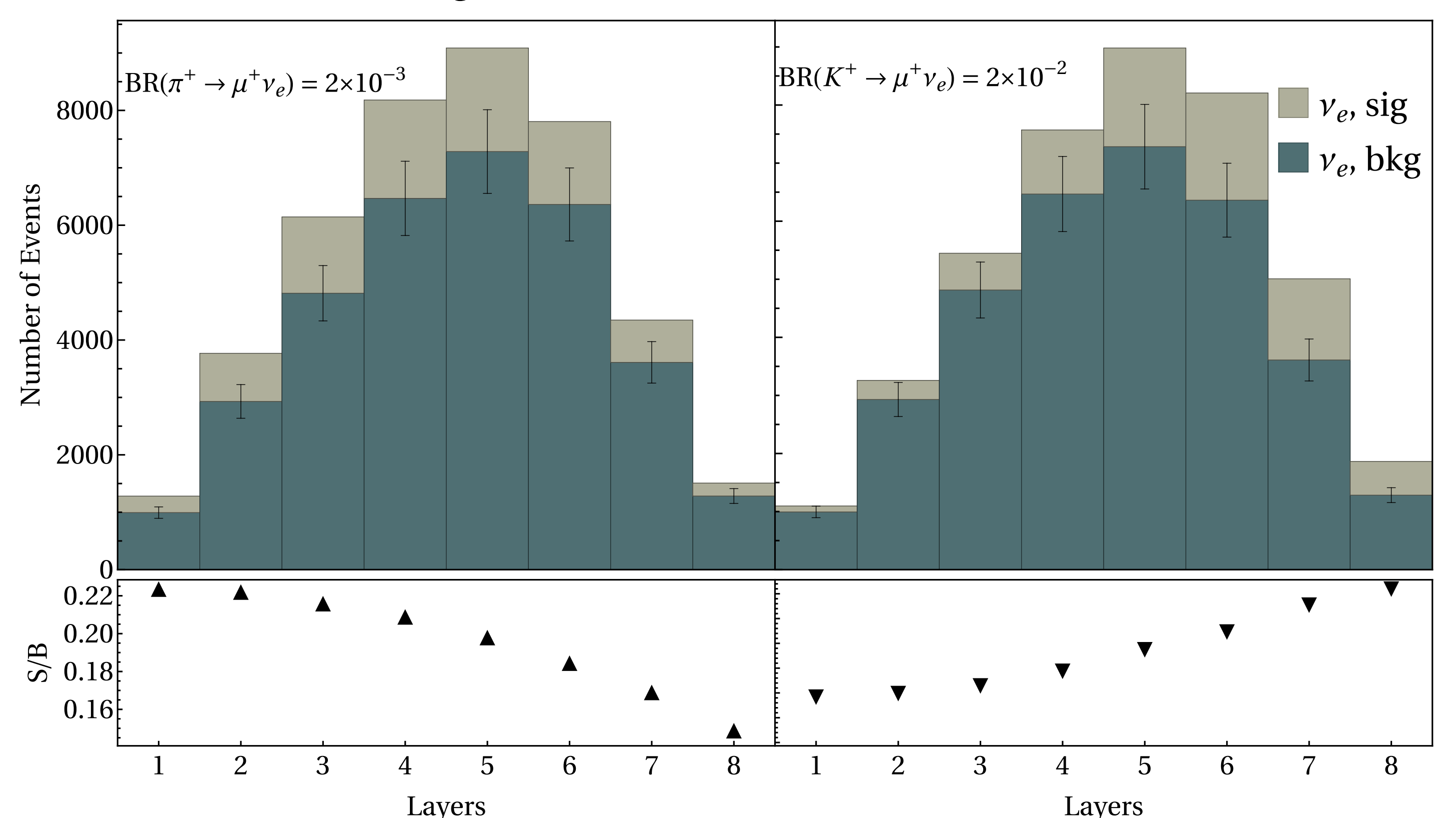
Approach:

- Fluxes are public.
- Information of parent particle from PYTHIA.
- Statistical analysis based on χ^2 minimization taking into account fluxes uncertainties and correlations.

SBND-PRISM



Signal: Excess of electron neutrino events



Lepton Flavor Violating Decays			
Experiment	$BR(\pi^+ \rightarrow \mu^+ \nu_e)$	$BR(K^+ \rightarrow \mu^+ \nu_e)$	$\Lambda^{(6)}$ (TeV)
BEBC	8×10^{-3}	4×10^{-3}	0.59 - 4.9
SBND (10%)	1.5×10^{-3}	1.7×10^{-2}	0.89 - 4.6
SBND-PRISM (10%, 5%)	1.2×10^{-3}	5.8×10^{-3}	0.94 - 5.8
SBND-PRISM (10%, 2%)	8.9×10^{-4}	3.2×10^{-3}	1 - 6.8
Statistics only	8.5×10^{-5}	8.6×10^{-4}	1.8 - 9.4

Lepton Number Violating Decays			
Experiment	$BR(\pi^+ \rightarrow \mu^+ \bar{\nu}_e)$	$BR(K^+ \rightarrow \mu^+ \bar{\nu}_e)$	$\Lambda^{(6)}$ (TeV)
BEBC	1.5×10^{-3}	3.3×10^{-3}	0.89 - 6.7
SBND (10%)	4.0×10^{-3}	3.9×10^{-2}	0.7 - 3.6
SBND-PRISM (10%,5%)	3.1×10^{-3}	1.3×10^{-2}	0.74 - 4.8
SBND-PRISM (10%,2%)	2.1×10^{-3}	7.4×10^{-3}	0.82 - 5.5
Statistics only	2.1×10^{-4}	1.9×10^{-3}	1.5 - 7.7