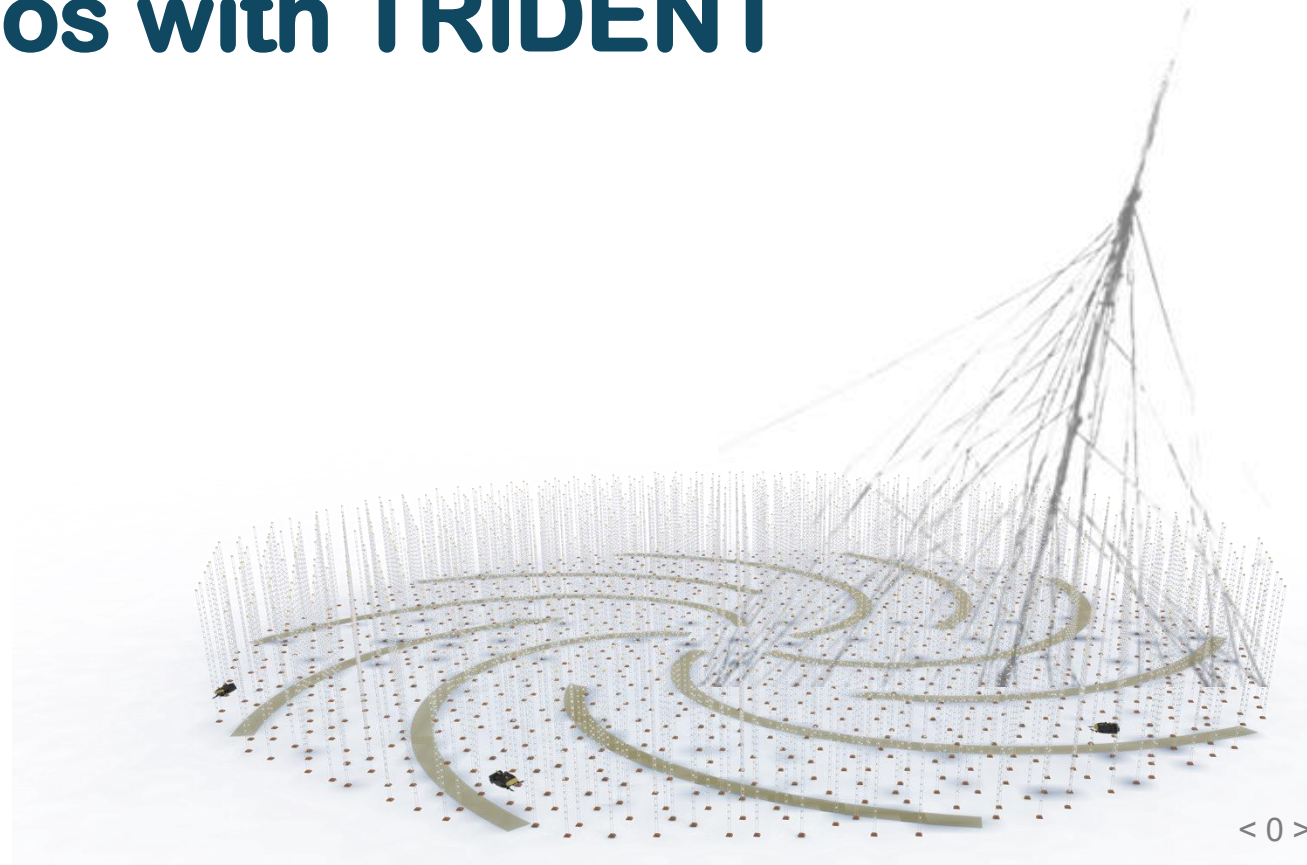


Prospects of Detecting Prompt Atmospheric Neutrinos with TRIDENT

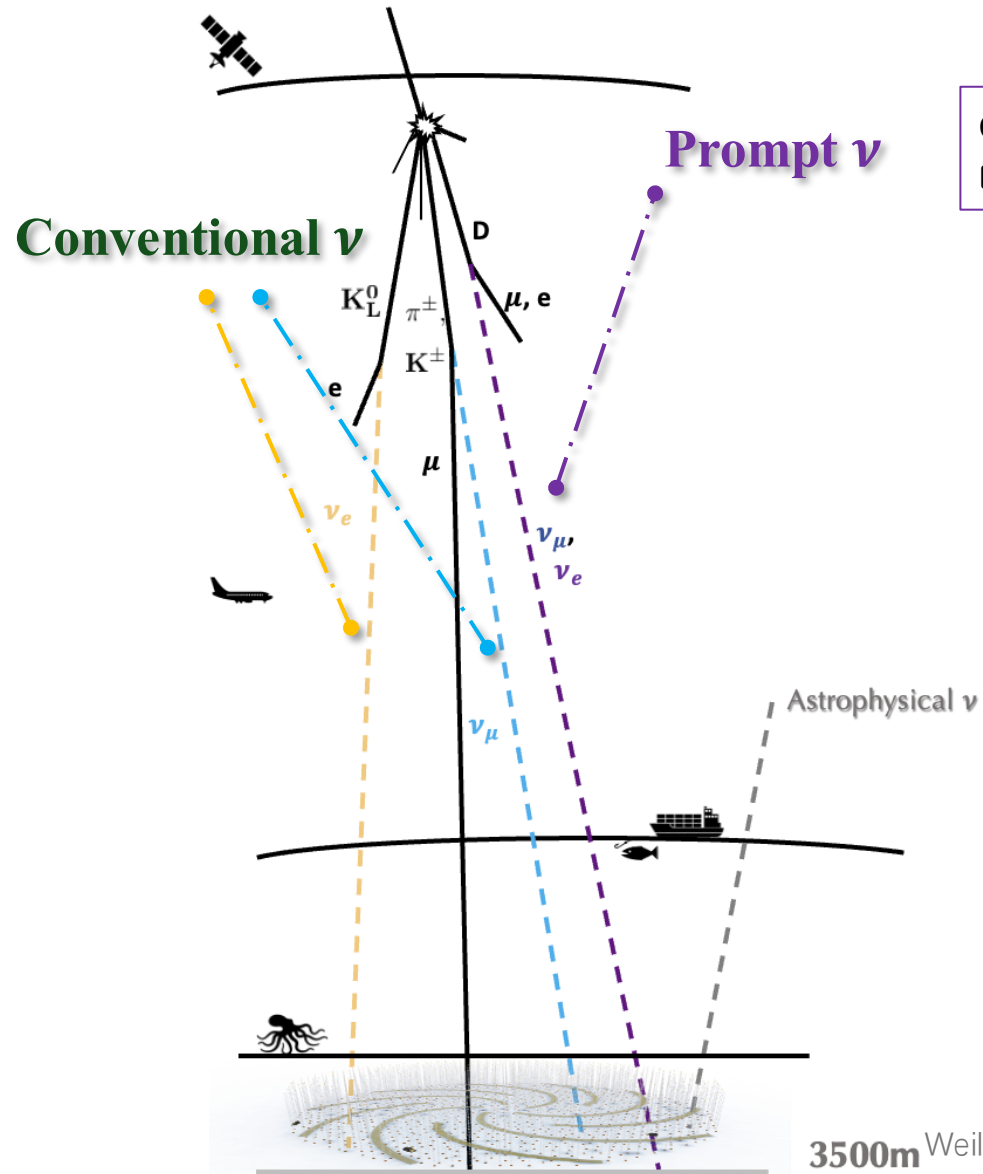
Weilun Huang (黄炜伦)

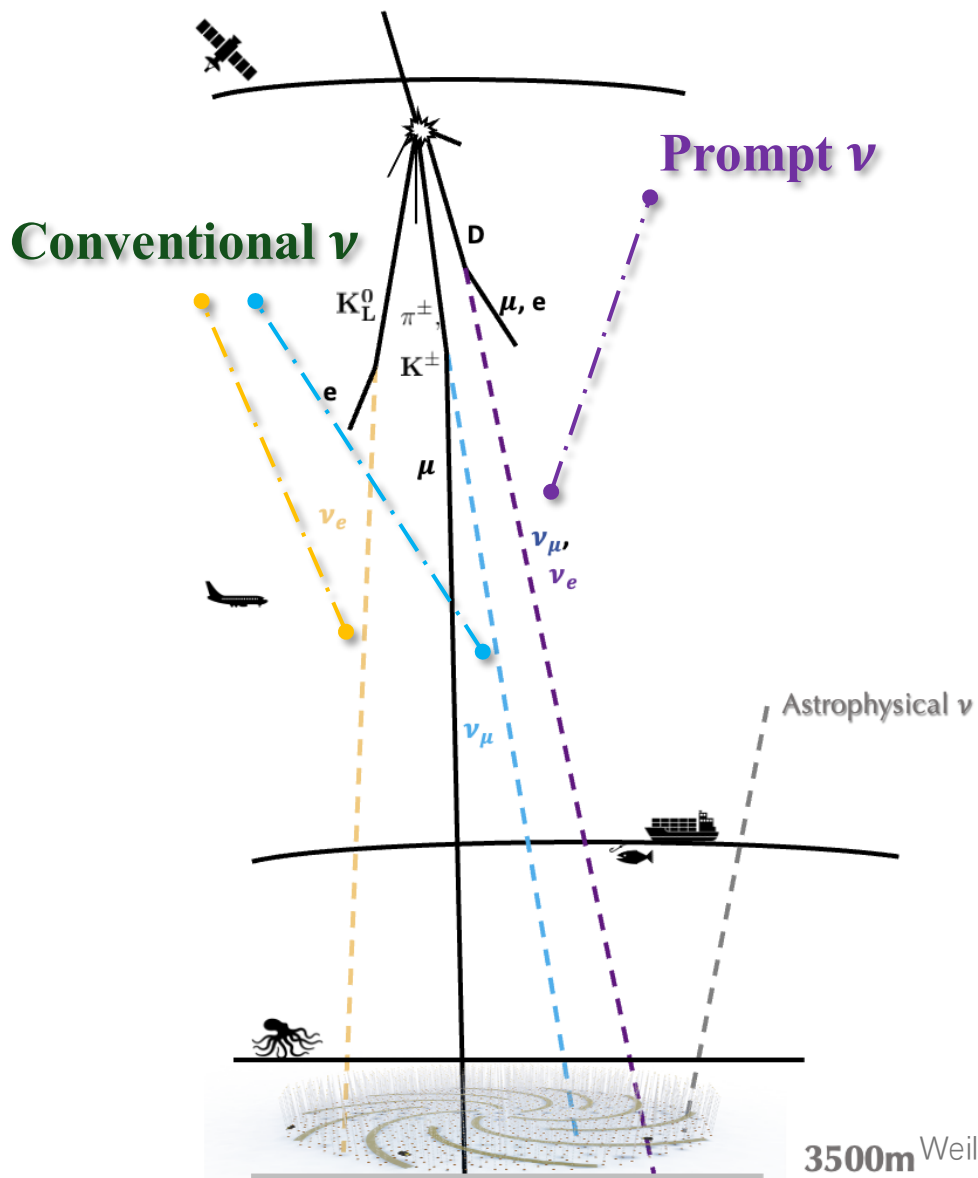
中国物理学会高能物理分会

July 17, 2026



Motivation



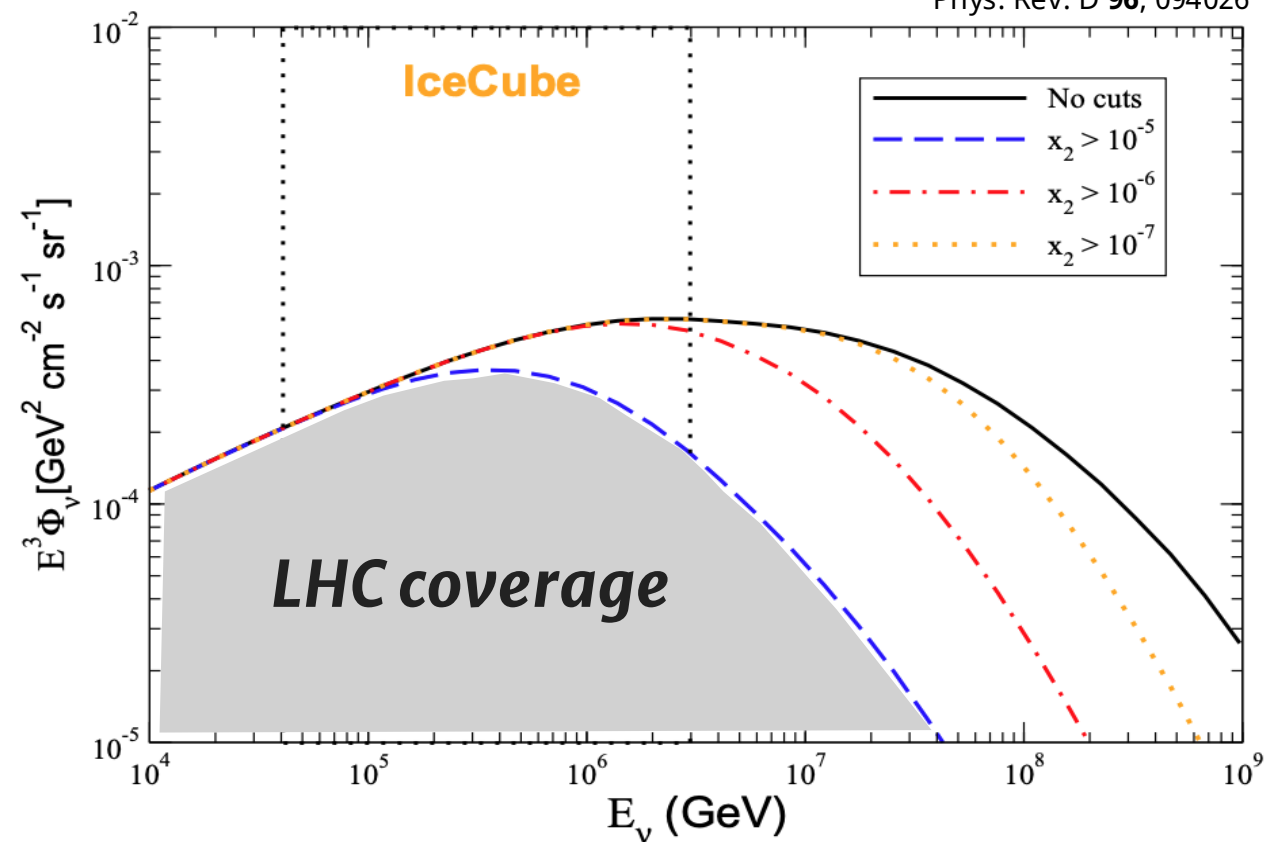


Probe forward and small-x physics

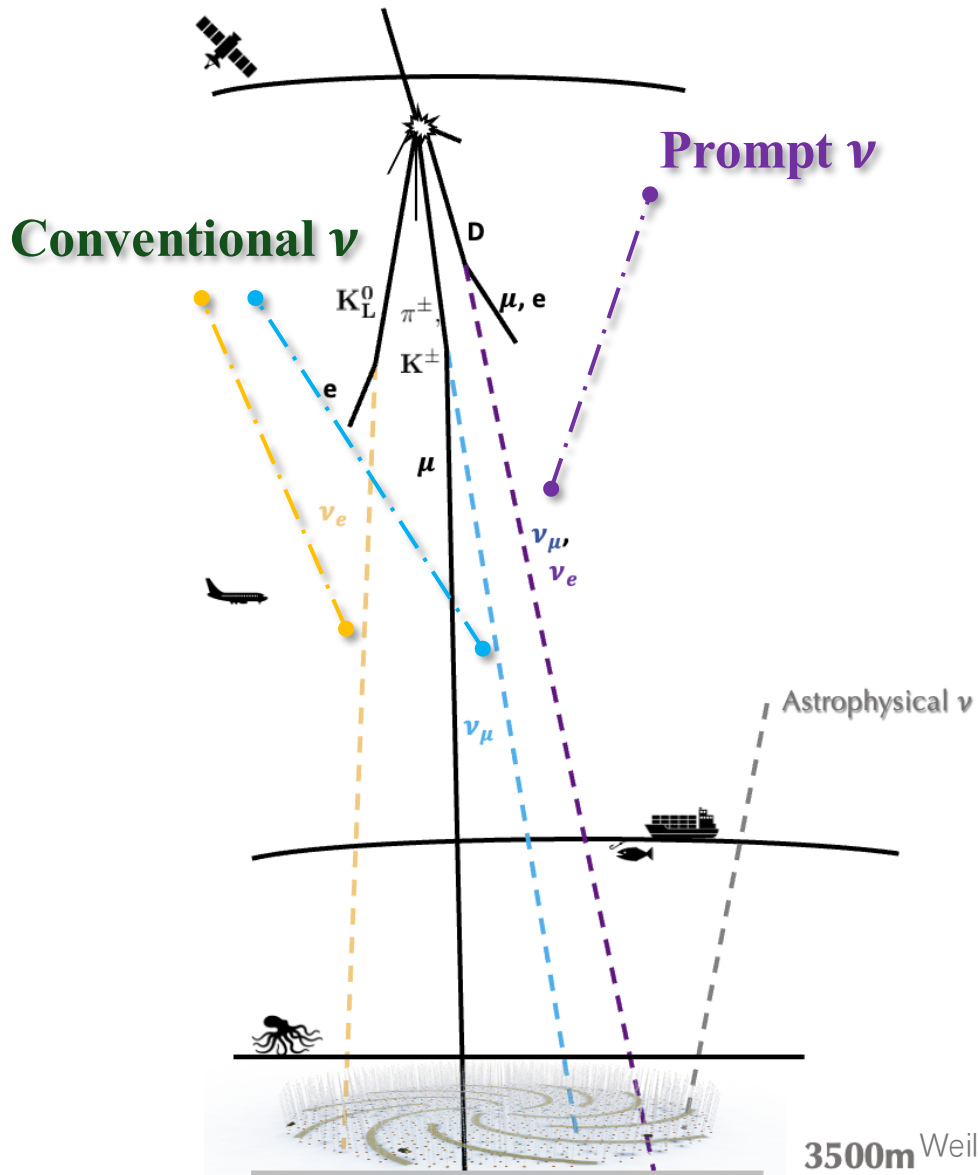
$<10^{-5}$

Slice of prompt neutrino flux into different x cut

Phys. Rev. D **96**, 094026

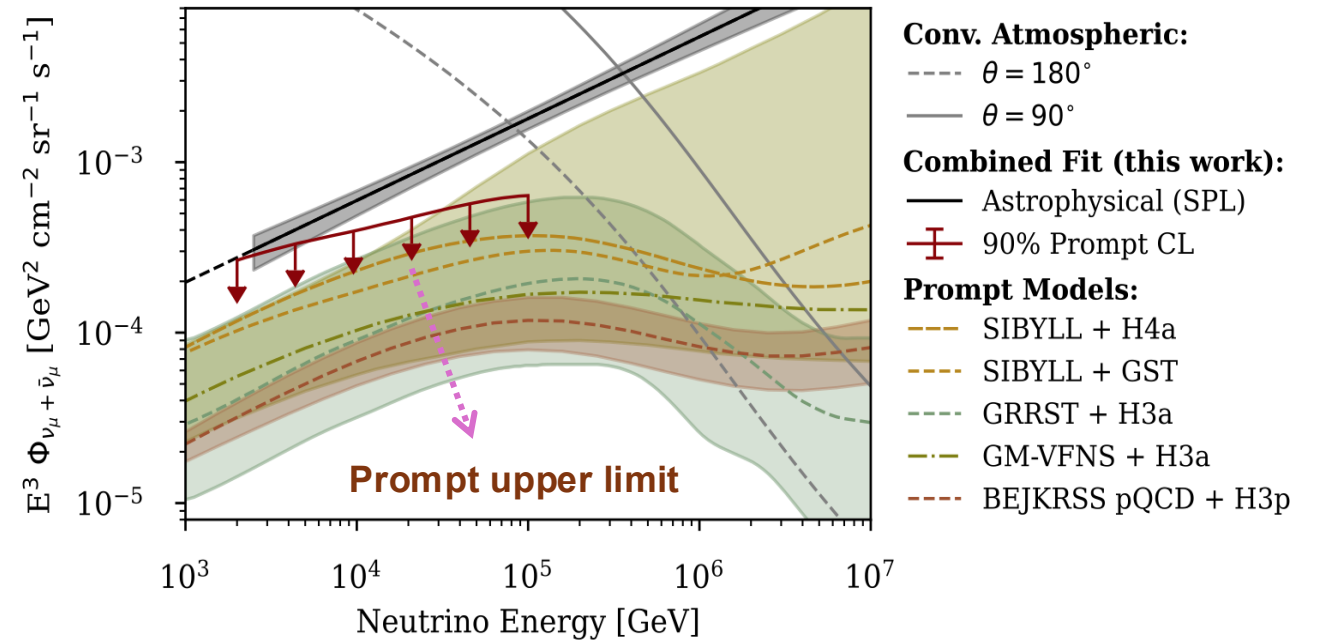


Challenge



No validated observations yet

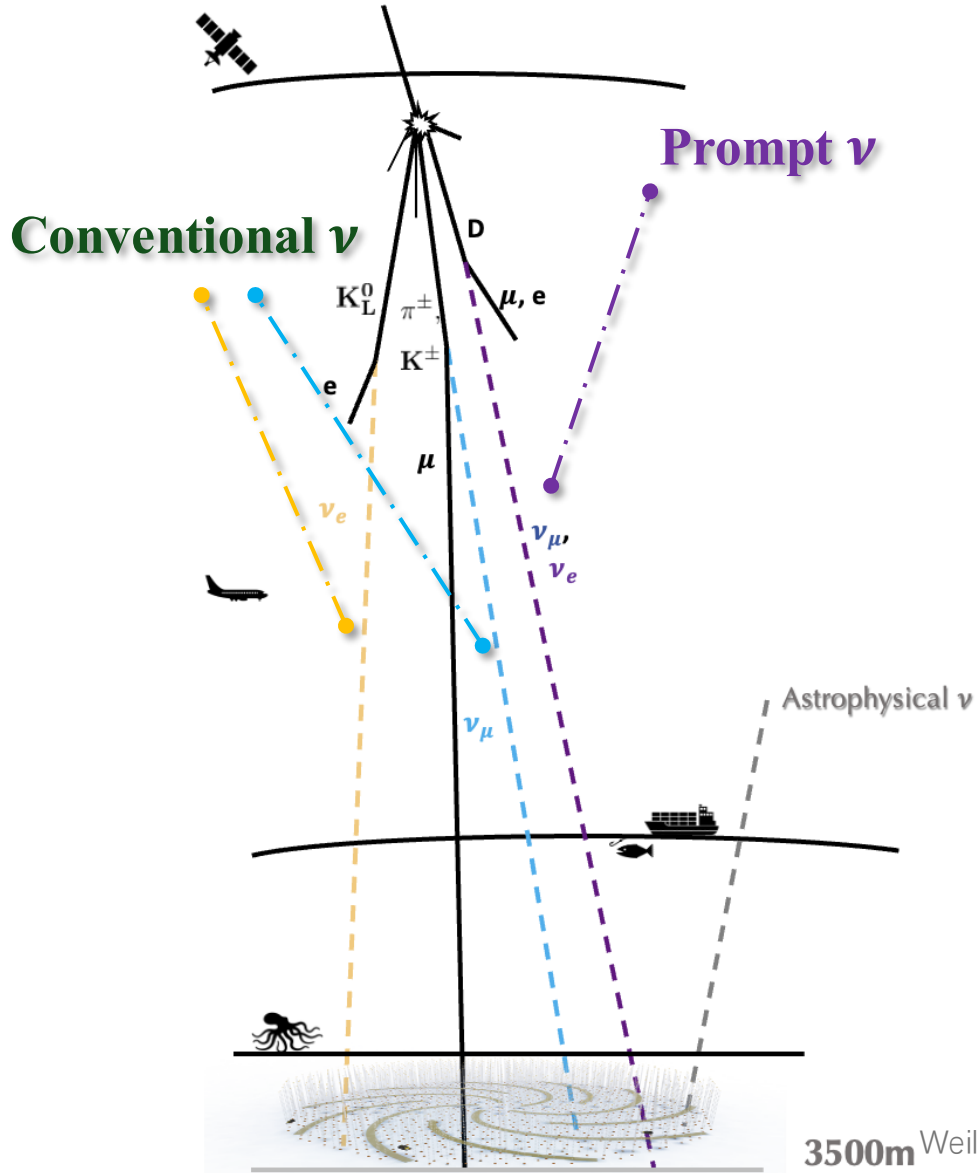
arxiv.org/abs/2512.17760



Backgrounds

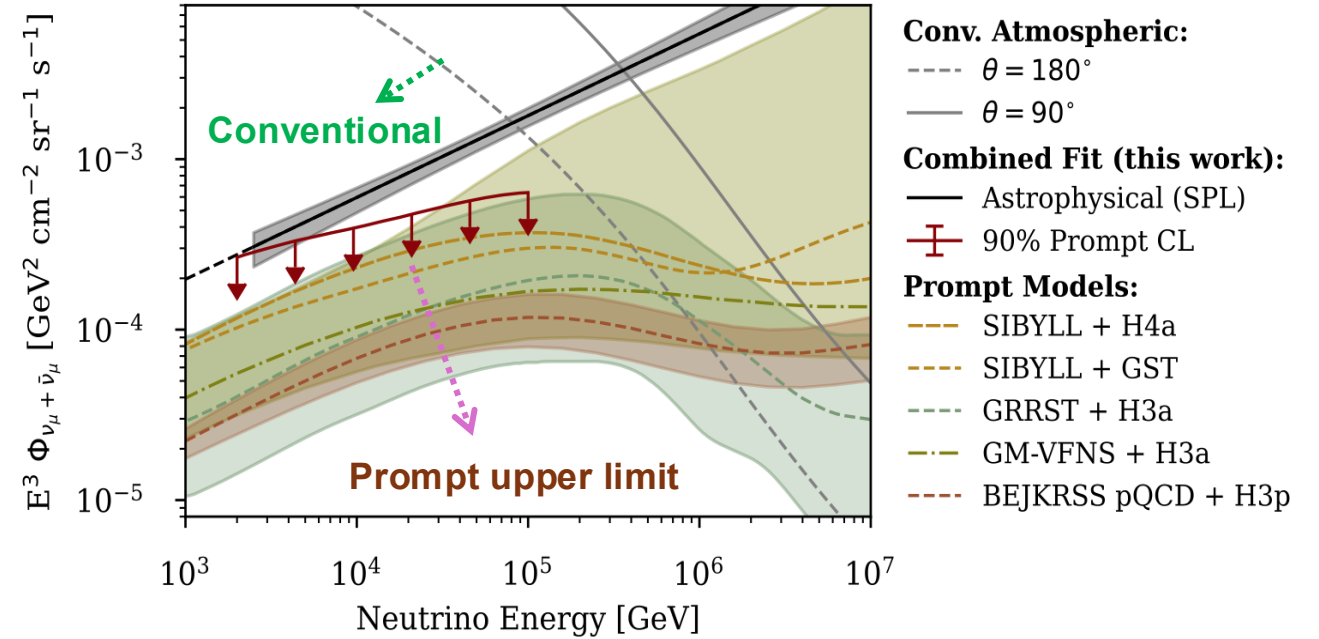
- **Conventional ν**
- **Astrophysical ν**
- **Atmospheric μ**

Challenge



No validated observations yet

arxiv.org/abs/2512.17760



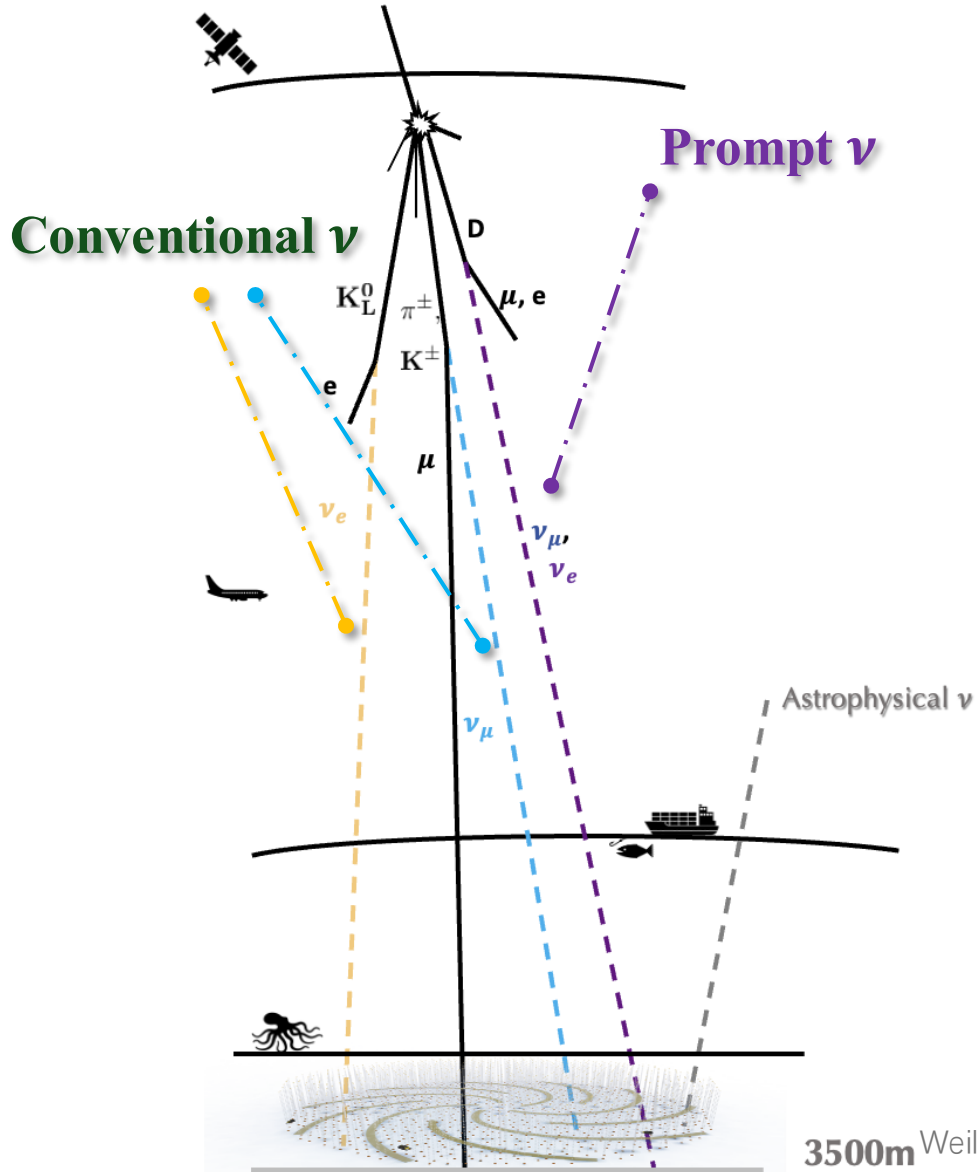
Backgrounds

- **Conventional ν**
- **Astrophysical ν**
- **Atmospheric μ**

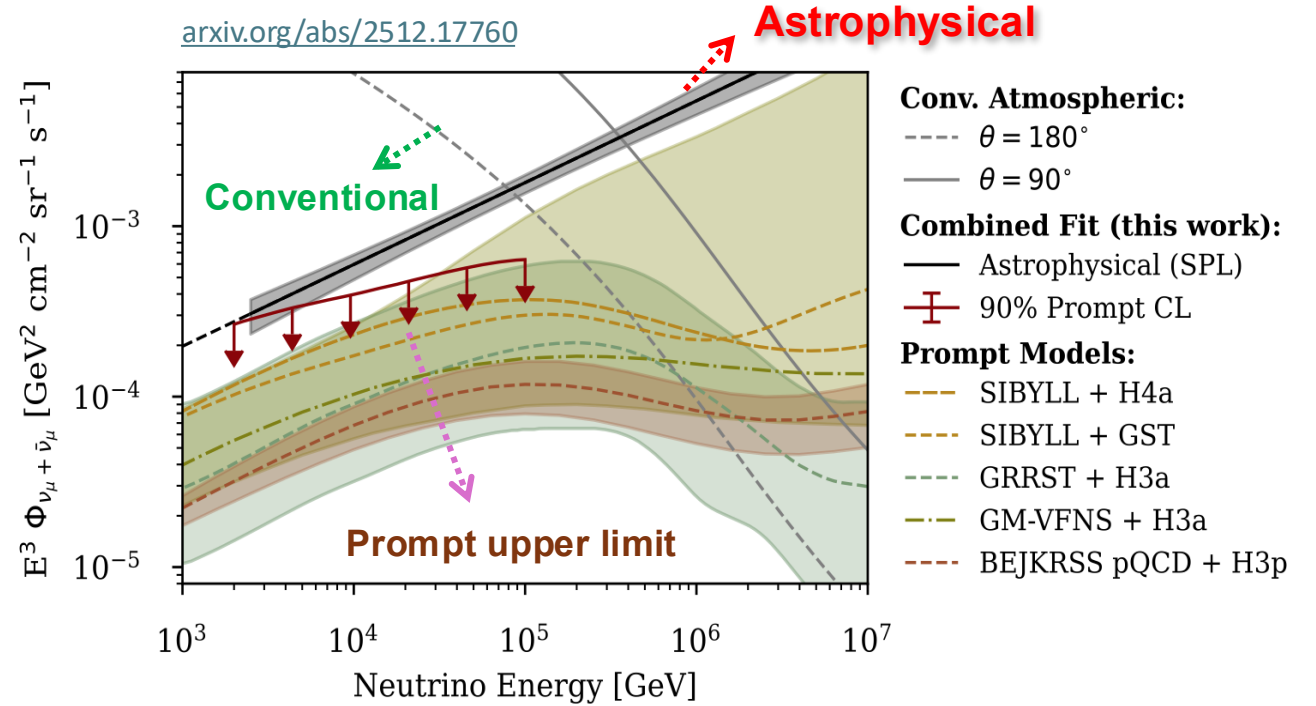
Bury prompt at low energy

Solution: go to higher energy

Challenge



No validated observations yet

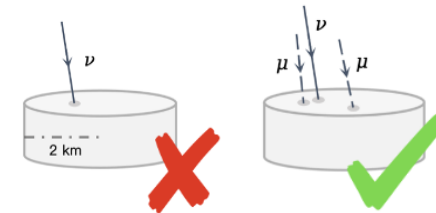


Backgrounds

- Conventional ν
- Astrophysical ν
- Atmospheric μ

Bury prompt at high energy

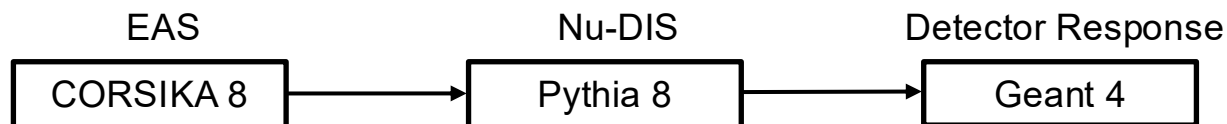
Solution:



Detection Prospects

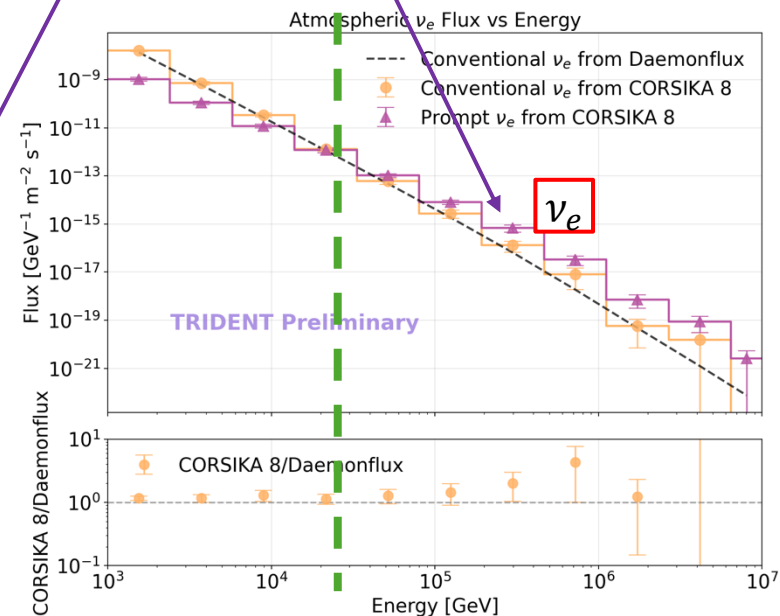
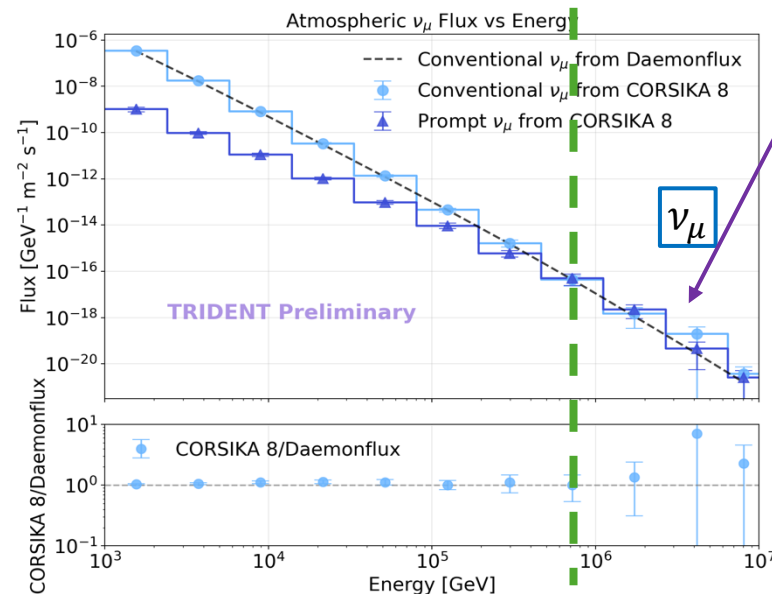
① Search at High Energy Region

Full simulation chain:



Neutrino fluxes at depth of 2500m

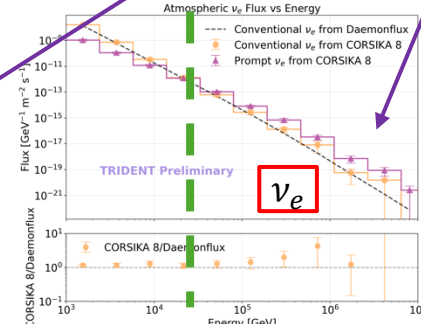
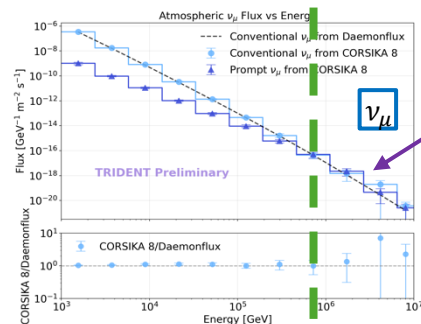
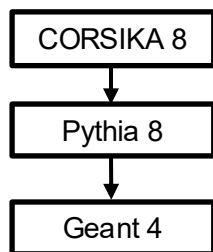
Prompts dominate above $\left\{ \begin{array}{l} \nu_\mu: \sim 1 \text{ PeV} \\ \nu_e: \sim 30 \text{ TeV} \end{array} \right.$



- Backgrounds
- Conventional ν
 - Astrophysical ν
 - Atmospheric μ

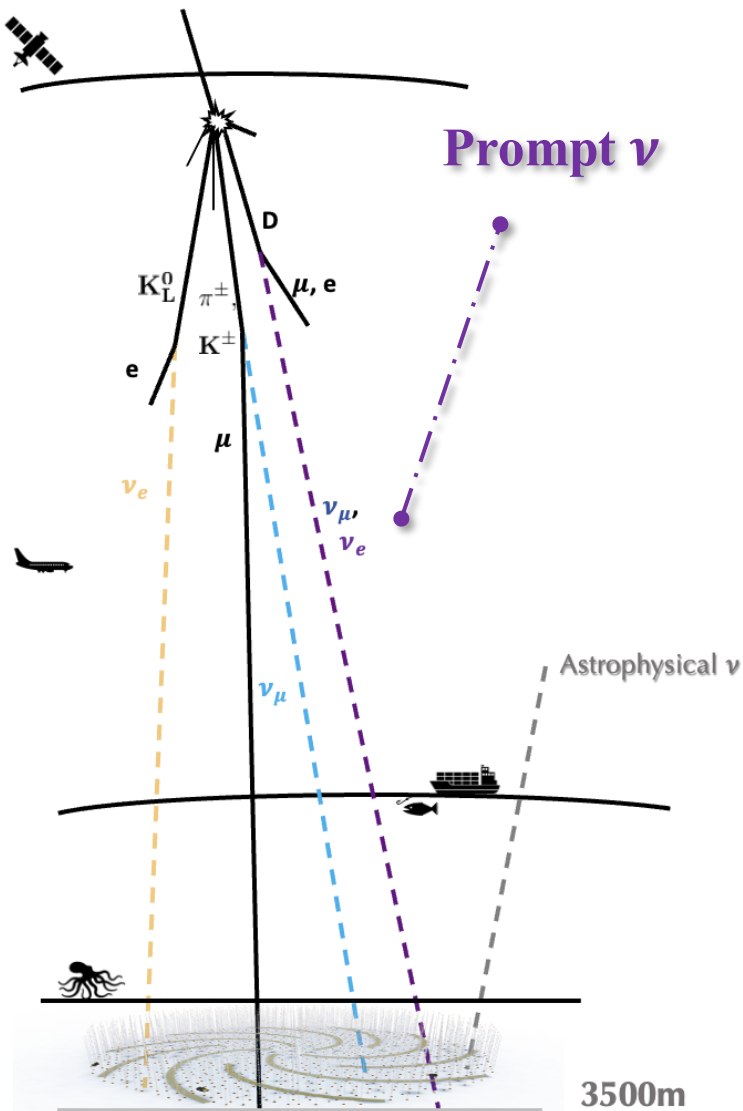
Detection Prospects

① Search at High Energy Region



Prompts dominate $\begin{cases} \nu_{\mu}: \sim 1 \text{ PeV} \\ \nu_e: \sim 30 \text{ TeV} \end{cases}$

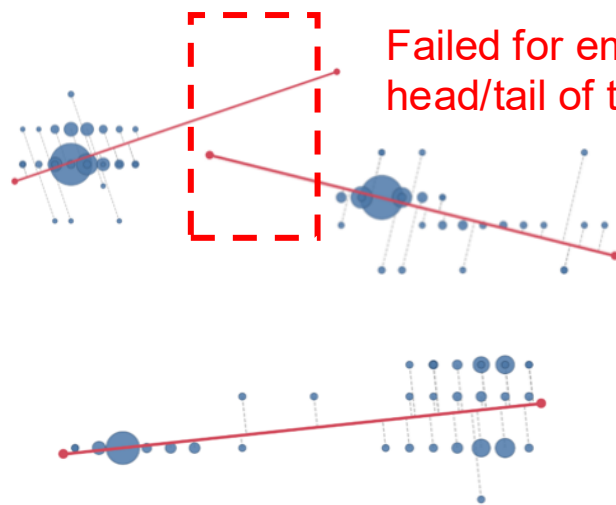
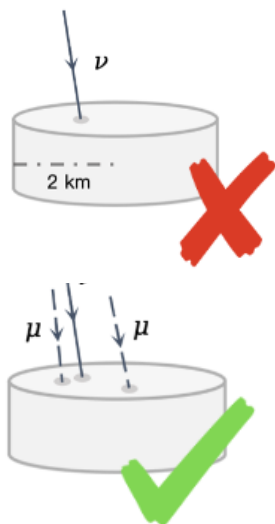
Prompt ν



② Neutrino events with muon accompanying

PoS (ICRC2025) 1062

Reconstruction



Backgrounds:

- Conventional ν
- Astrophysical ν
- μ (work in progress)