

FPF Meeting #4

White Paper — BSM with Neutrinos

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“BSM with Neutrinos”

Naturally invokes overlap with the broader BSM section, and shares many common aspects:

- Model similarities
- Similar (or even identical) signals and backgrounds in FPF detectors
- ...

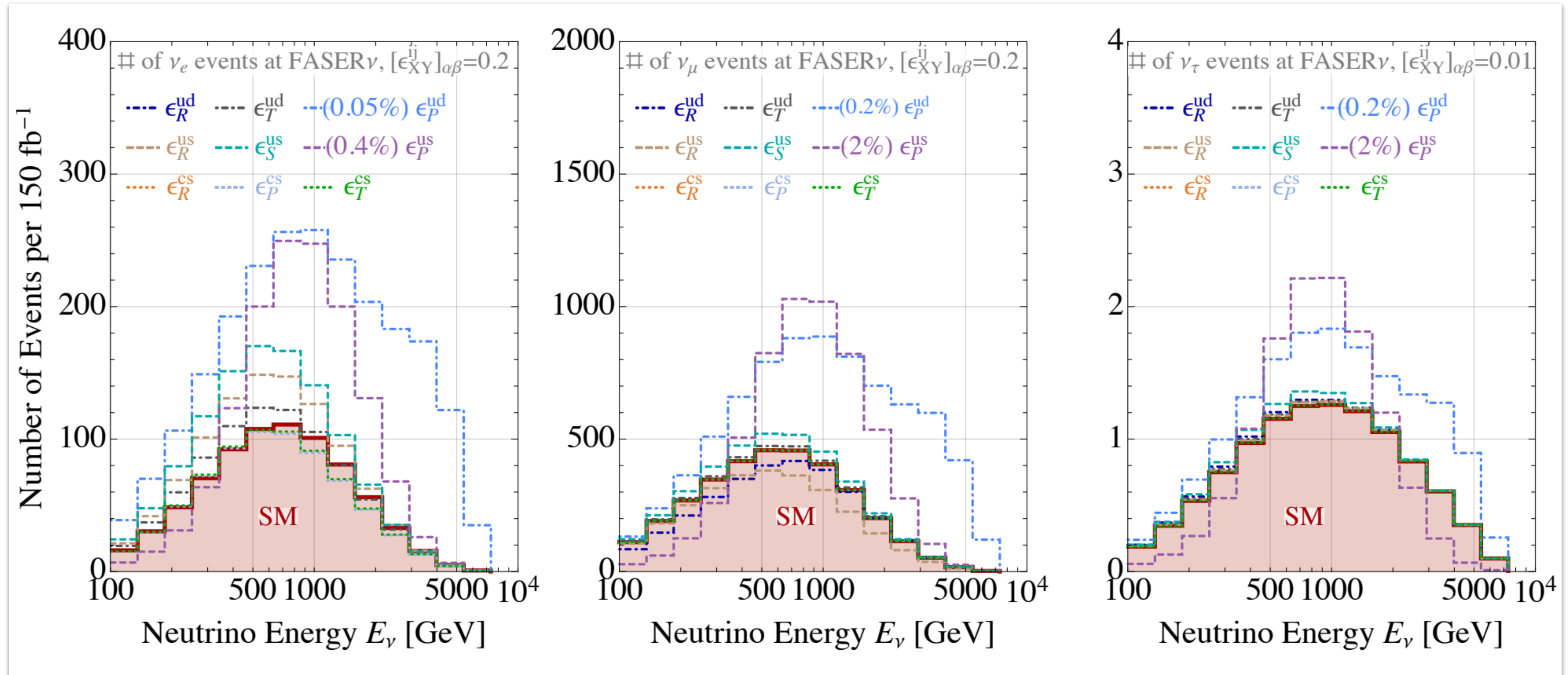
Our judgement: this chapter includes beyond-the-Standard-Model signatures that arise from neutrinos, whether those neutrinos come from SM or BSM production.

Contributions

- NSI and Effective Field Theories [Du, Tabrizi]
- Effects of New Mediators [Farzan]
- Neutrino Magnetic Moments [Balantekin, Abraham]
- Oscillations and Sterile Neutrinos [Kärkkäinen]
- Up-scattering via Neutrino Dipole Portal [Jana]
- Neutrinophilic Dark Matter [Tuckler]

Scattering with New EFT Operators

Falkowski et al, [2105.12136]



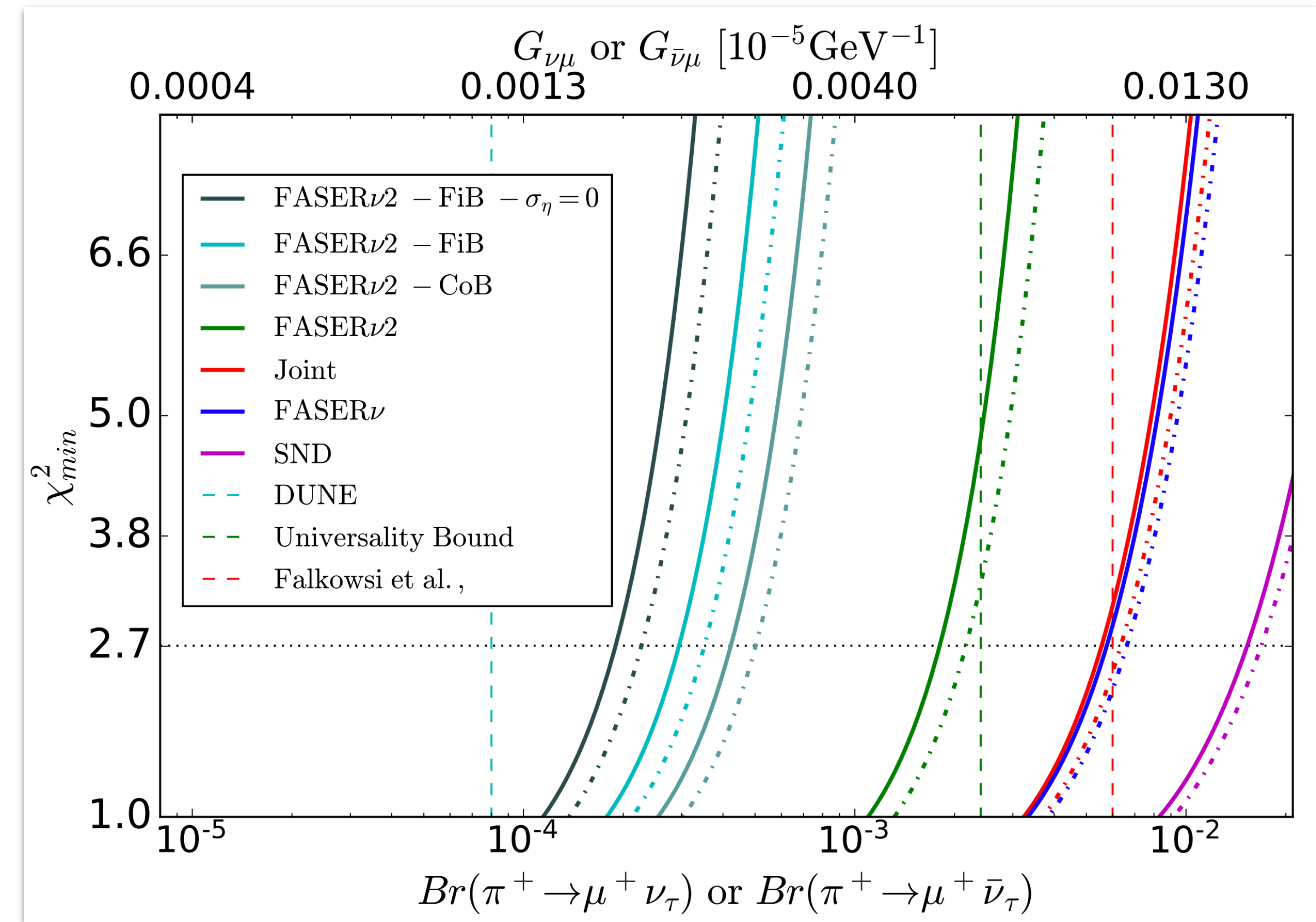
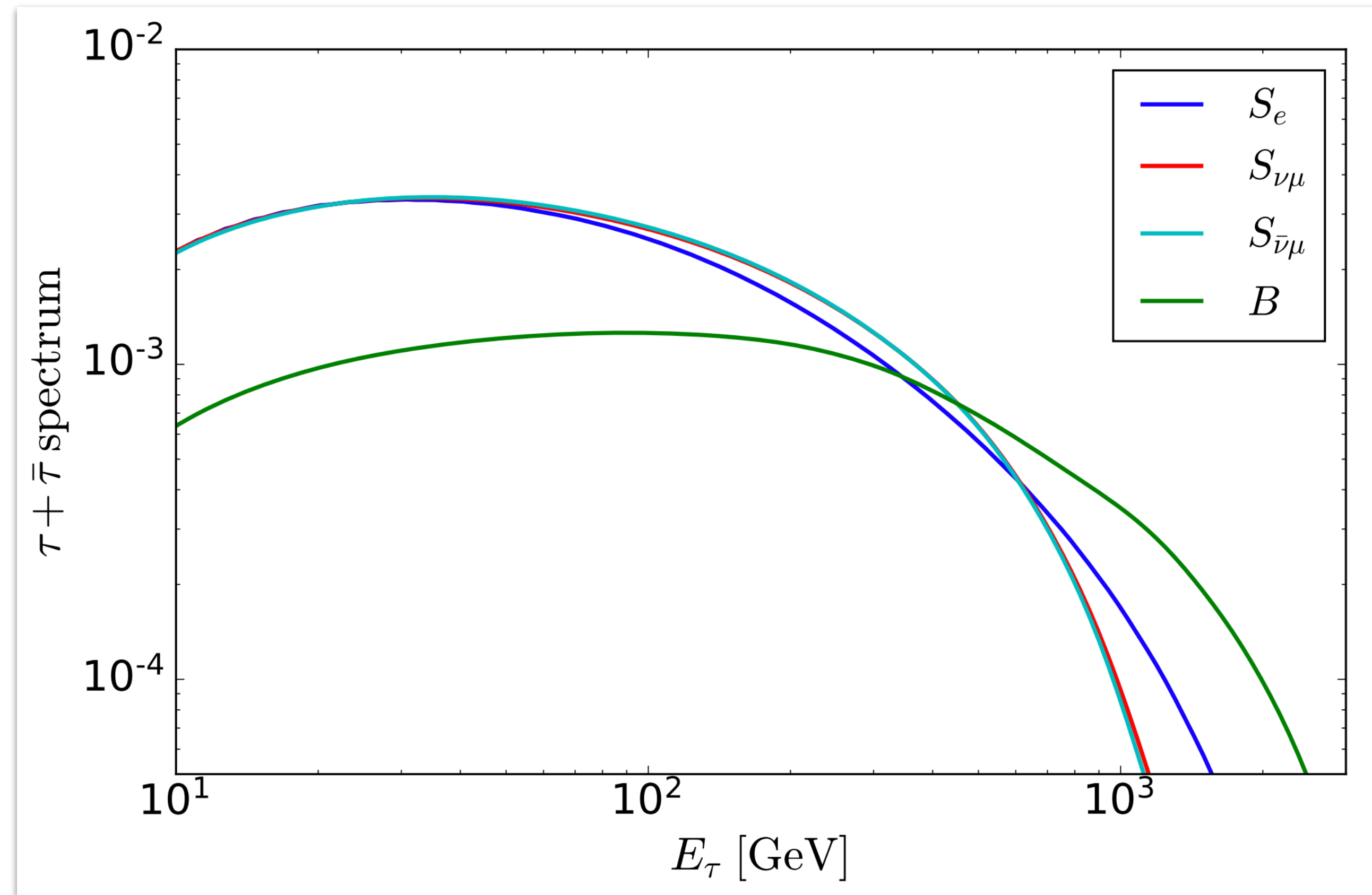
New four-fermion operators induce (a) additional production of neutrinos from meson decays and (b) new contributions to scattering in detectors.

See also: [Yong Du's talk yesterday](#)

New Physics from New Mediators

Ansarifard & Farzan, [2112.08799]

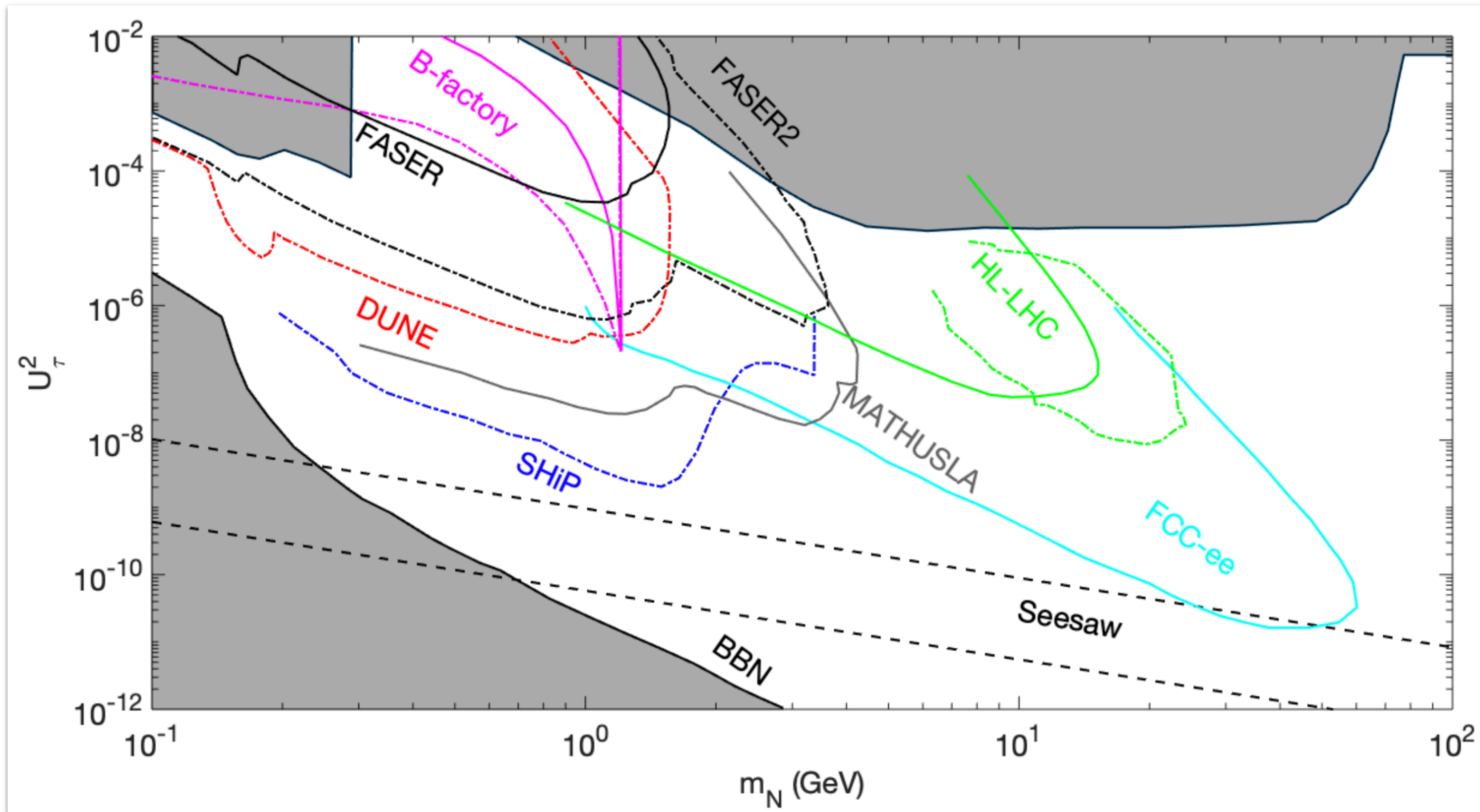
Yasaman Farzan's talk yesterday



Also detailed — UV completions, consistent models that give rise to these new effects.

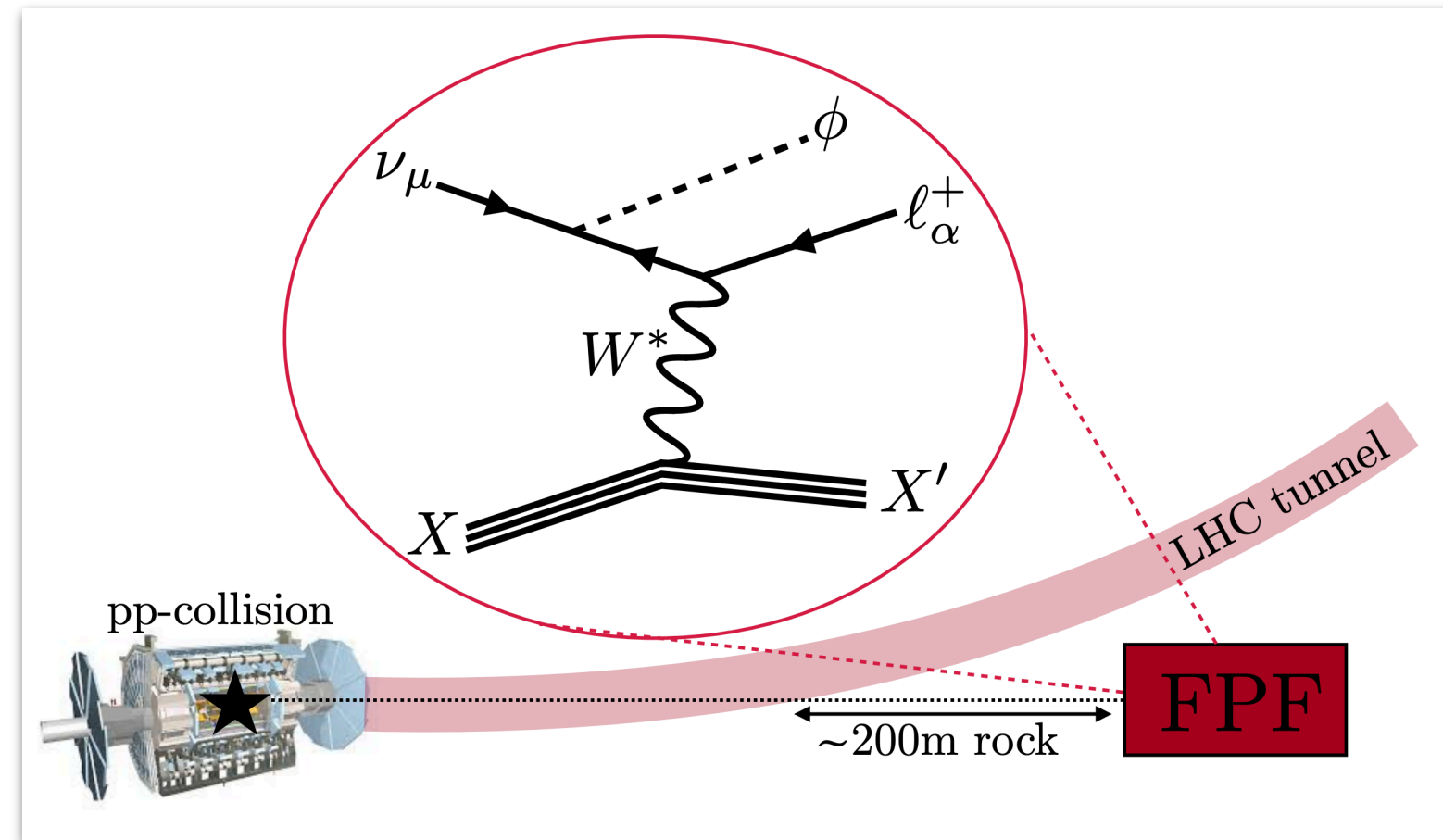
Sterile Neutrinos at FPF

Timo Kärkkäinen's talk yesterday

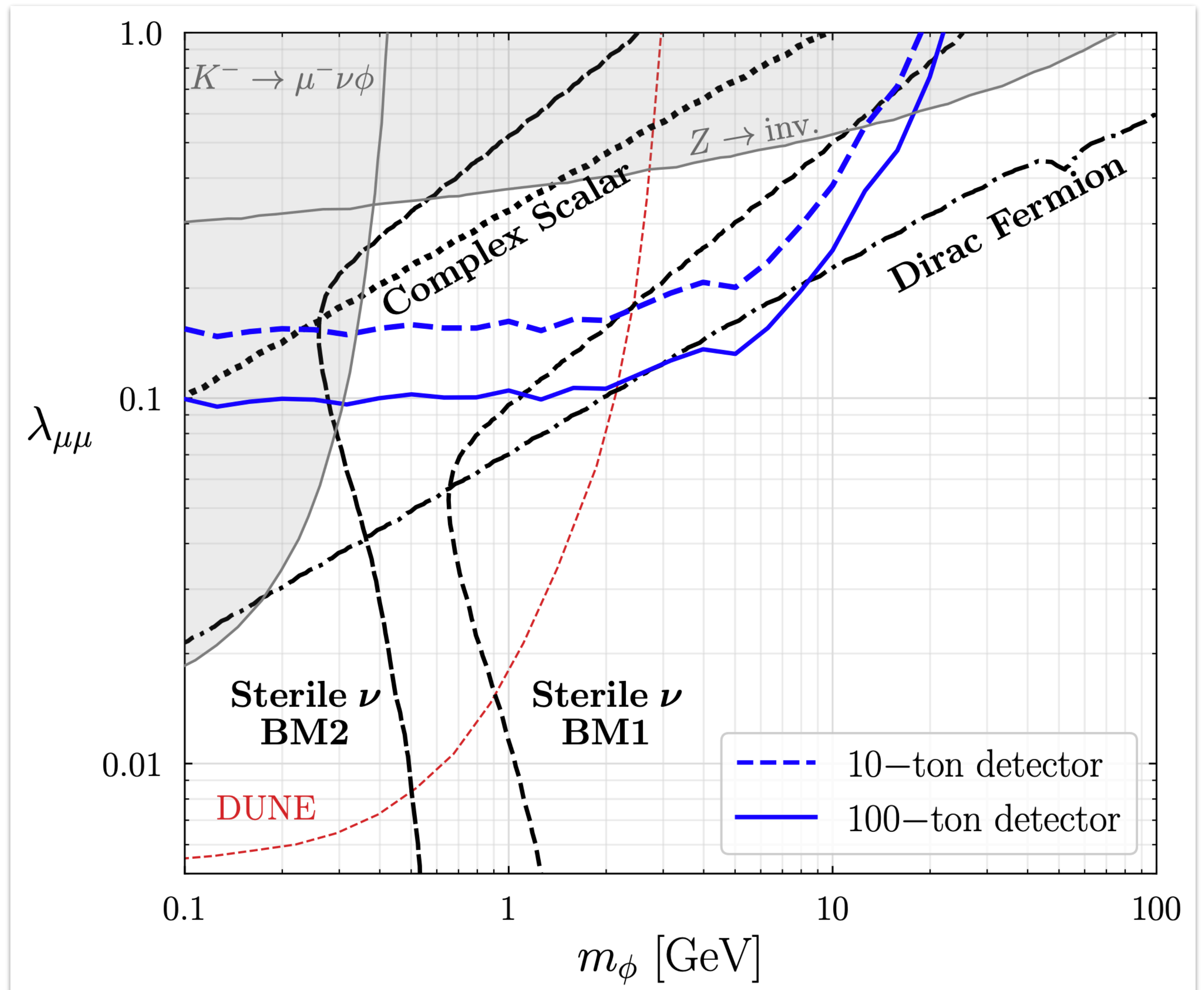


To be discussed — does this type of physics belong here or BSM?

Neutrinophilic Dark Matter at the FPF



New mediator (possibly connected to DM) can be emitted in neutrino scattering, leading to signatures with large missing transverse momentum.



Wrap-up

- ✦ Many new-physics models predict modifications to neutrino rates at FPF.
- ✦ Some modify the flux, some modify the cross section, some both.
- ✦ Can introduce novel kinematical signatures in many cases that the FPF detectors (depending on type) can exploit).
- ✦ More exciting work to come!