INVISIBLES24

Heavy neutral lepton corrections to SM boson decays: EWPO & LFU(V) in low-scale seesaw realisations

based on EPJC 84 (2024) 2, 149, with A. Abada, J. Kriewald, S. Rosauro and A. M. Teixeira

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ALMA MATER STUDIORUM UNIVERSITÀ DI BOLOGNA

INFN

HIDDeν Hunting Invisibles: Dark sectors, Dark matter and Neutrinos

Asymmetry Essential Asymmetries of Nature

HNL & modified currents

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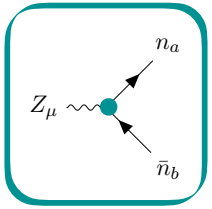
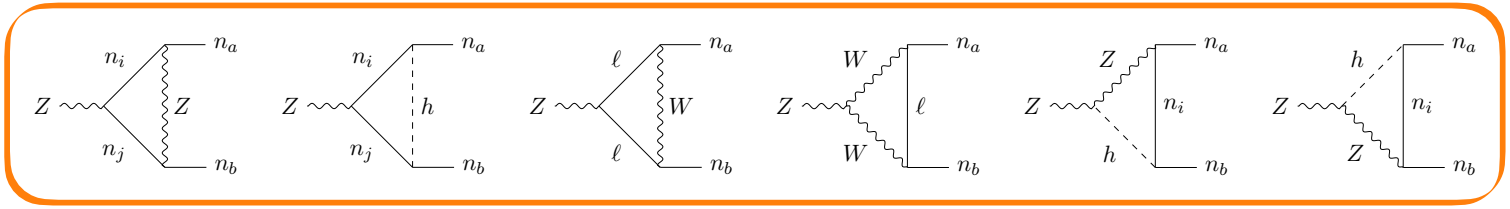
Low-scale seesaw: addition of **heavy neutral leptons**, non-decoupled, **sizeable mixings** with active ν and **non-unitary lepton mixing** $\tilde{\mathcal{U}}^{\text{PMNS}}_{\alpha i}$

$\Longrightarrow$ **Modified charged & neutral** lepton currents!





Sizeable impact on **flavour observables** both at **tree** and **loop level**

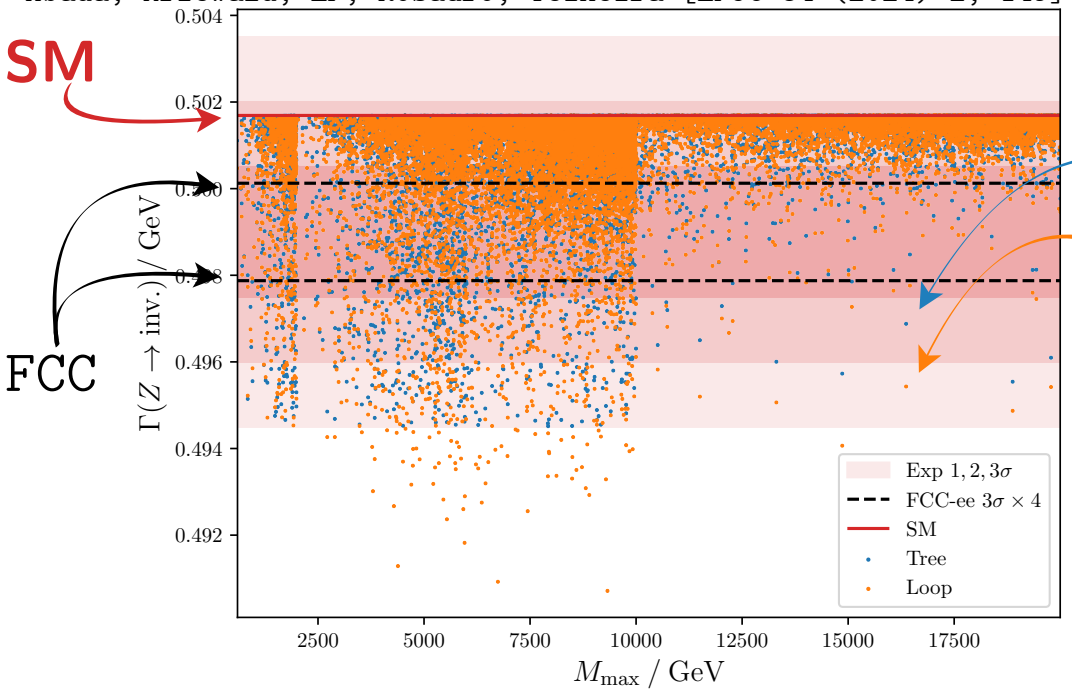
LFUV, EWPO (*very good exp. accuracy*) and **cLFV** (*in general* ***very constraining***)

Can EWPO (and LFUV) supersede cLFV bounds?

↪ Consider **(one-loop) contributions** of **HNL** to these observables & illustrate with **well motivated m_ν mechanism: ISS(3,3)**

Invisible Z width

Abada, Kriewald, **EP**, Rosauro, Teixeira [EPJC 84 (2024) 2, 149]



Difference between

tree-level and

loop contributions

up to **5 MeV**!

(current exp. uncertainty 1.5 MeV)

↝ **Considerably smaller values** than **SM prediction**

(already in tension with measurement)

↝ **NLO corrections** to invisible Z width **significant**!

$\Longrightarrow$ **FCC-ee** expected to **probe important regimes**

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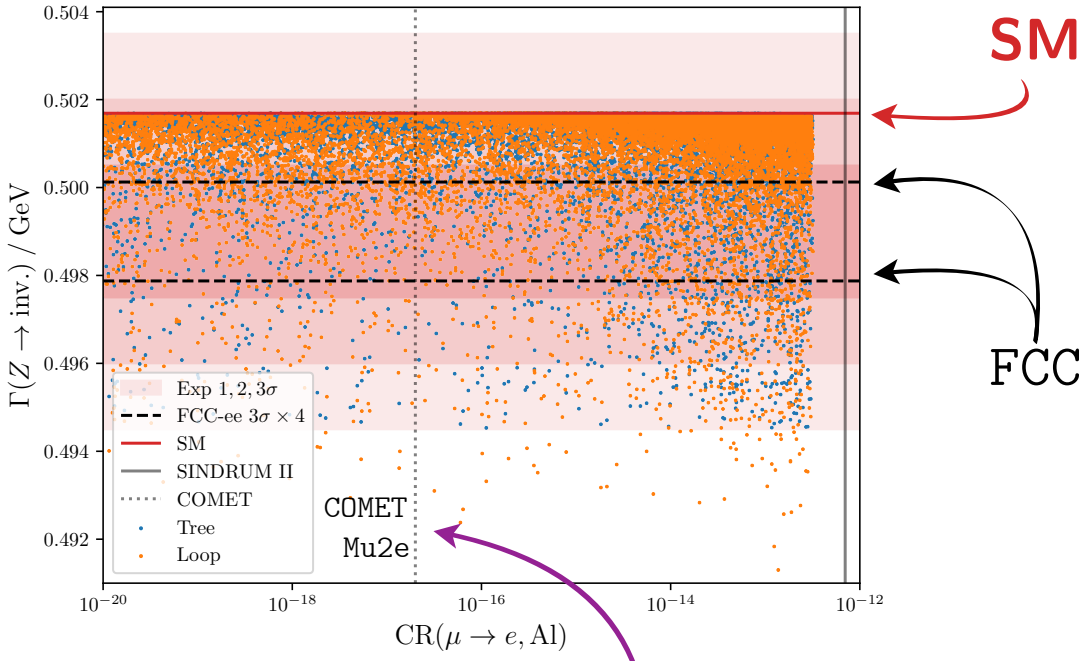
cLFV in $\mu - e$ sector:

usually **most stringent**

constraints on **HNL**

Abada, Kriewald, **EP**, Rosauro, Teixeira [EPJC 84 (2024) 2, 149]



But important role of precision observables:

$\Gamma(Z \to \text{inv.})$ can **explore regimes beyond future reach of cLFV exp.**

$\Gamma(Z \to \text{inv.})$ can **probe regimes with sizeable or negligible cLFV!**

Concluding remarks

EWPO observables can **supersede** **cLFV** (future) bounds

Future **FCC-ee** expected to **probe important regimes of the ISS**

Relevance of **NLO contributions** in **all** explored parameter space!

Thank you for your attention

More details at the poster session