

Renormalizable Portals:
(SM SINGLET) X (DS SINGLET)

DARK SECTOR (DS)

$$\bar{L}\tilde{H}N$$

Heavy neutrinos

$$\frac{M_N}{2}\overline{N^c}N$$

Neutrino masses?

Neutrino portal

$$B_{\mu\nu}X^{\mu\nu}$$

Dark photons

$$G_{SM} \times U(1)_X$$

New fundamental forces?



Vector portal

$$S^\dagger S (H^\dagger H)$$

Dark scalars

$$V(H, S)$$

Scalar degrees of freedom

Scalar portal

Dim-5 axion "portal"
special, see other talks

$$\frac{a}{\Lambda}G_{\mu\nu}\tilde{G}_{\mu\nu}$$

\mathcal{L}_{SM}