

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

To Catch'em all

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

Neutrino portal

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

Vector portal

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

Scalar portal

DARK SECTOR (DS)



Heavy neutrinos

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

Neutrino masses?



Dark photons

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

New fundamental forces?



Dark scalars

$$V(H, S)$$

Scalar degrees of freedom

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

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

