Z boson decay into a (pseudo)scalar and a photon at the FCC-ee/CEPC

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Who are we?

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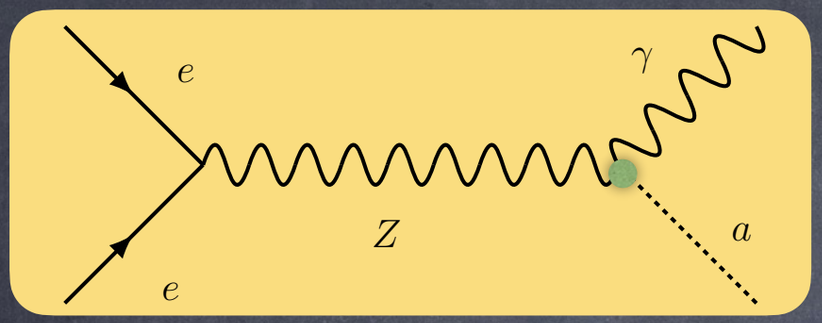
What are we interested in?

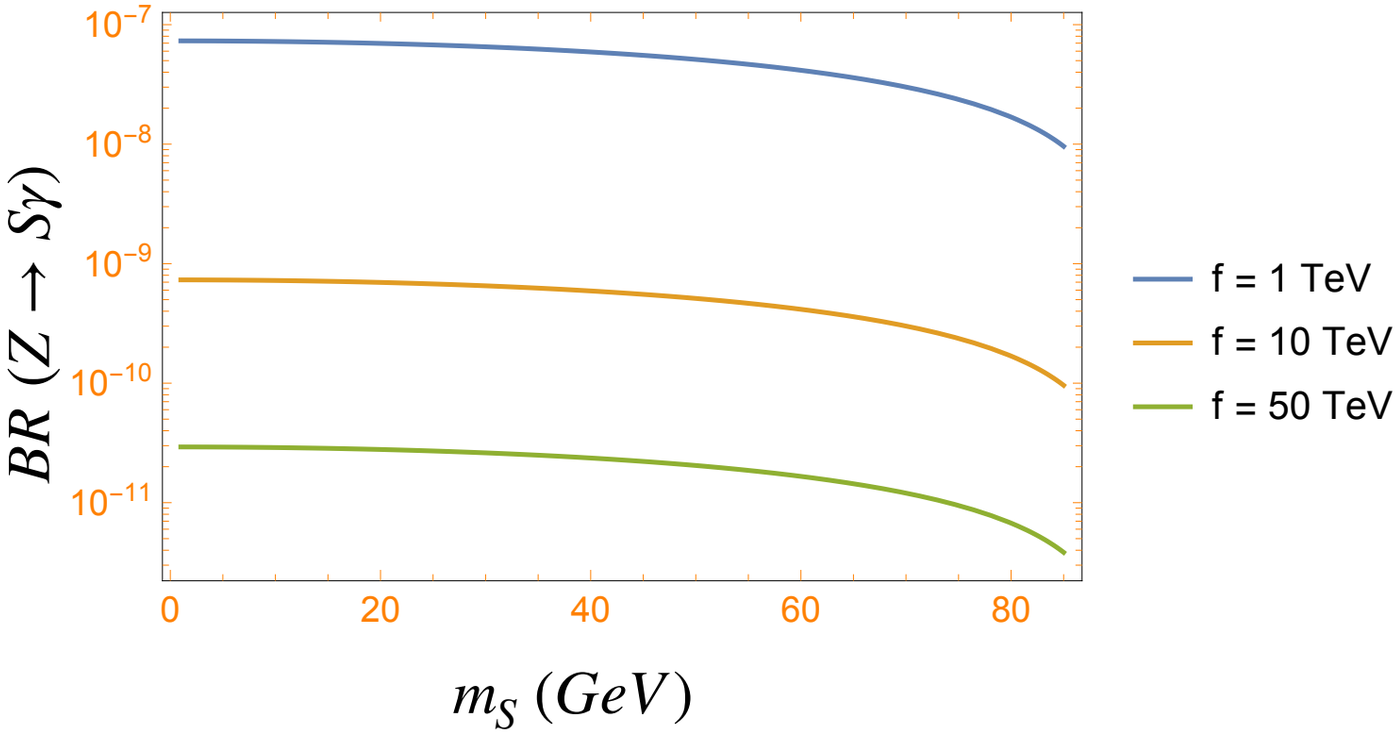
Inspired by composite Higgs models, study (pseudo)scalars that are produced via rare Z decays (with a photon)

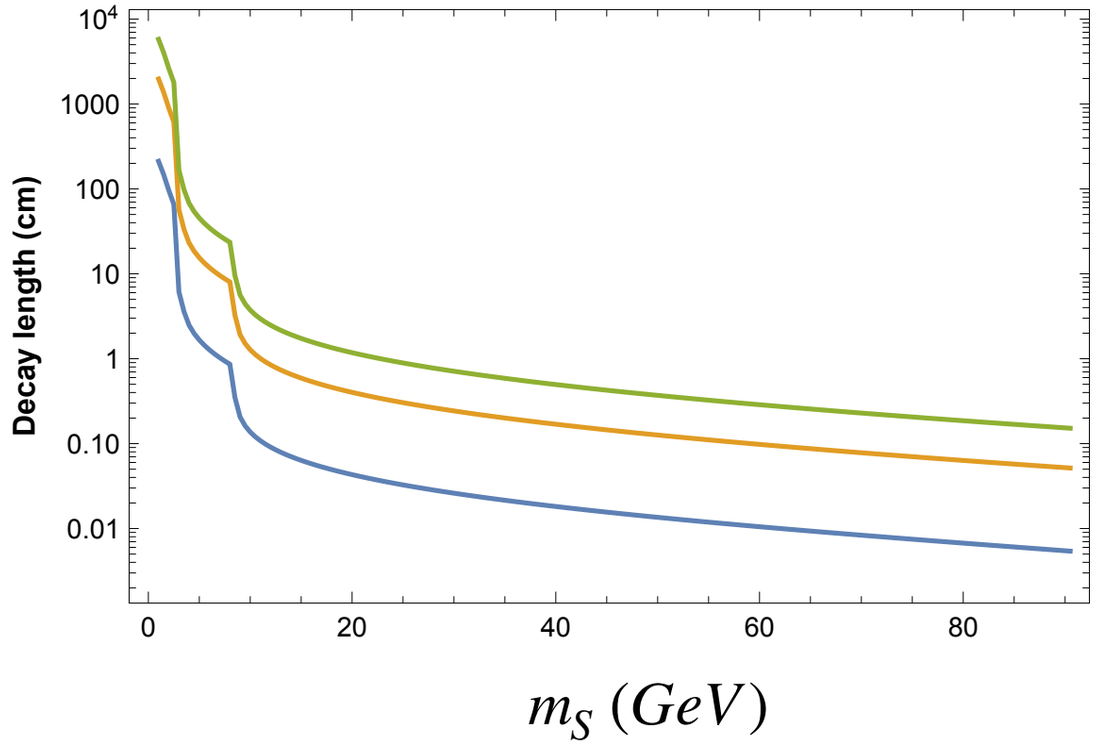


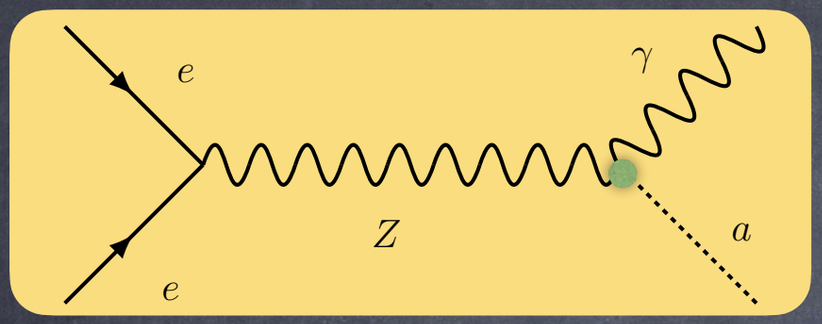
- Inspired by composite models, but applies to all ALP models!
- Production rate and decay length are correlated.

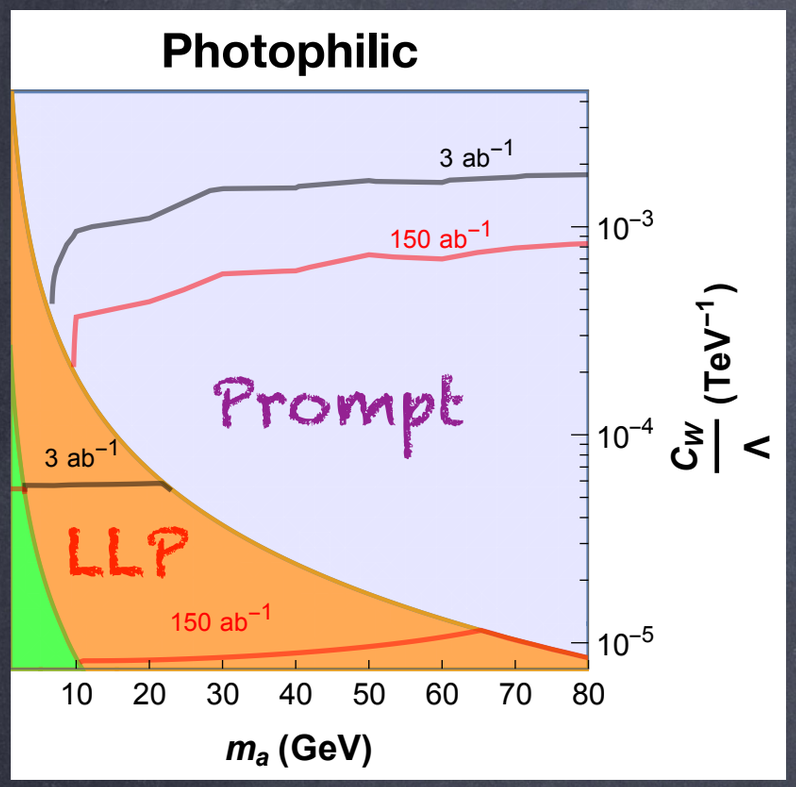
$$\mathcal{L}_{\text{eff}} = \frac{S}{\Lambda}\left(g^2 C_W\, W_{\mu\nu}\tilde{W}^{\mu\nu} + g'^2 C_B\, B_{\mu\nu}\tilde{B}^{\mu\nu}\right) \qquad \frac{C_W}{\Lambda} = \pm\frac{C_B}{\Lambda} = \frac{N_{TC}}{64\sqrt{2}\pi^2 f}$$

- 100% BR to $\gamma\gamma$ if $C_W = C_B$, heavy fermions $b\bar{b}$ and $\tau\tau(\mu\mu)$ for $C_W = -C_B$.









- Decays $S \to \gamma\gamma$ <u>or</u> $S \to b\bar{b}/\tau^+\tau^-/\mu^+\mu^-$.
- Study HL-LHC reach in prompt and LLP regions.
- Study reach at next e+e- collider.
- Initial study for $\gamma\gamma$ channel.
- FCC/CEPC simulation in progress.

LHC: From Les Houches 2023