

SHARING BUT NOT CARING AT COLLIDERS

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Snowmass 2021, EF10 DM@Colliders, topical meeting

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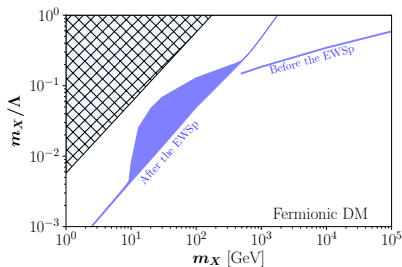
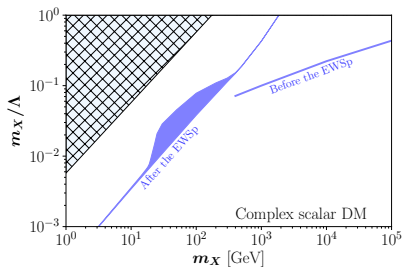
Shared asymmetry operators

- DM and SM sectors share a common B or $B - L$ asymmetry through [N.Bernal, C. S. Fong, N. Fonseca, JCAP 1609 (2016) no.09, 005]

$$\frac{1}{\Lambda^{5-p}} \mathbf{X X} \epsilon_{ik} \epsilon_{jl} (l_L^i l_L^j) (H^k H^l) \quad (\text{Before EWSph})$$

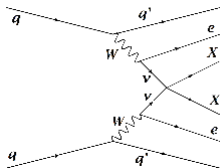
$$\frac{1}{\Lambda^{6-p}} \mathbf{X X} \epsilon_{abc} \epsilon_{ij} (q_L^{ia} l_L^j) (d_R^b u_R^c) \quad (\text{After EWSph})$$

- fix $m_X > 1$ GeV $\Rightarrow 1/\Lambda$ is determined by the requirement of correct DM abundance and Baryon asymmetry $\Rightarrow 0.5$ TeV $\lesssim \Lambda \lesssim 10$ TeV

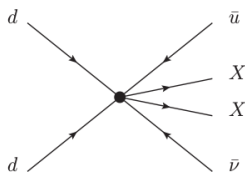
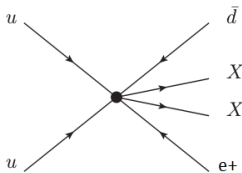


Collider signatures

- First operator gives rise to $pp \rightarrow e^\pm e^\pm XXjj$

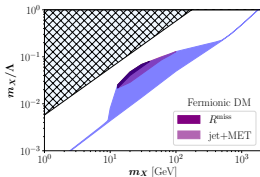


- Second operator gives rise to $pp \rightarrow je^+XX$ and $pp \rightarrow j\nu XX$

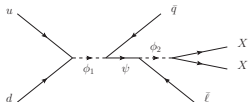


Proposed study

- Some constrains obtained from recasting jet+MET at 13 TeV
[N.Bernal, C. S. Fong, A. Tonerio, JHEP 08 (2018) 037]



- Look for $pp \rightarrow e^\pm e^\pm XXjj$ (recasting VBF or dedicated search) and $pp \rightarrow je^+XX$ (recasting $W+1$ jet or dedicated *monolepton+monojet+MET* search) at HL-LHC
- EFT validity \Rightarrow simplified models \Rightarrow other signatures ($gg, qq \rightarrow \phi_1\phi_1$, $\phi_1 \rightarrow jj$, $e^+e^- \rightarrow \gamma + \text{MET}, \dots$)





Thank you