Universidade do Minho
Escola de Ciências

Composite Higgs Models: *phenomenology*

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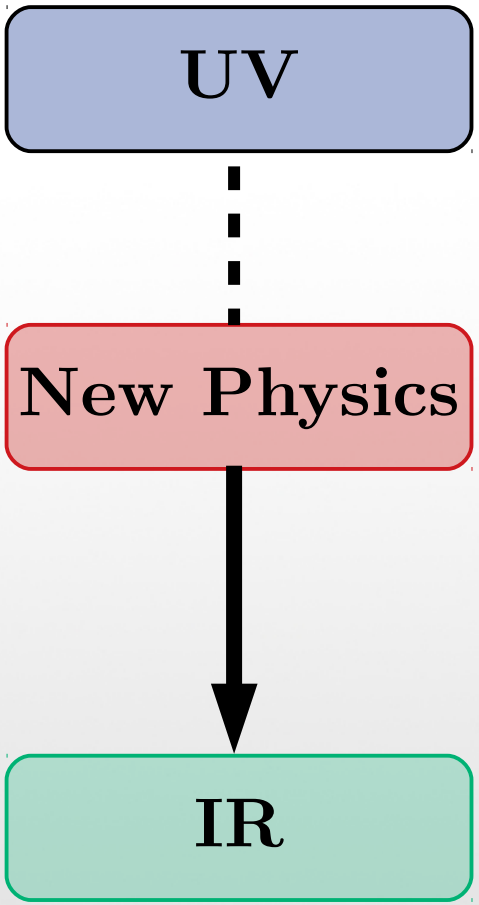
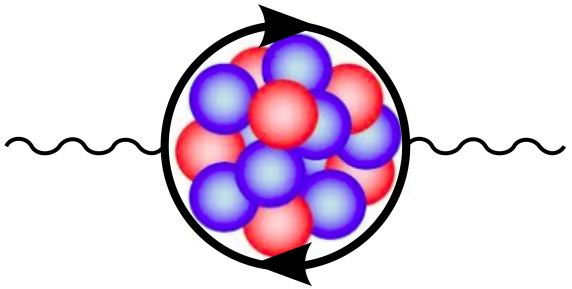
Supervised by Mikael Chala & Nuno Castro

The composite Higgs framework



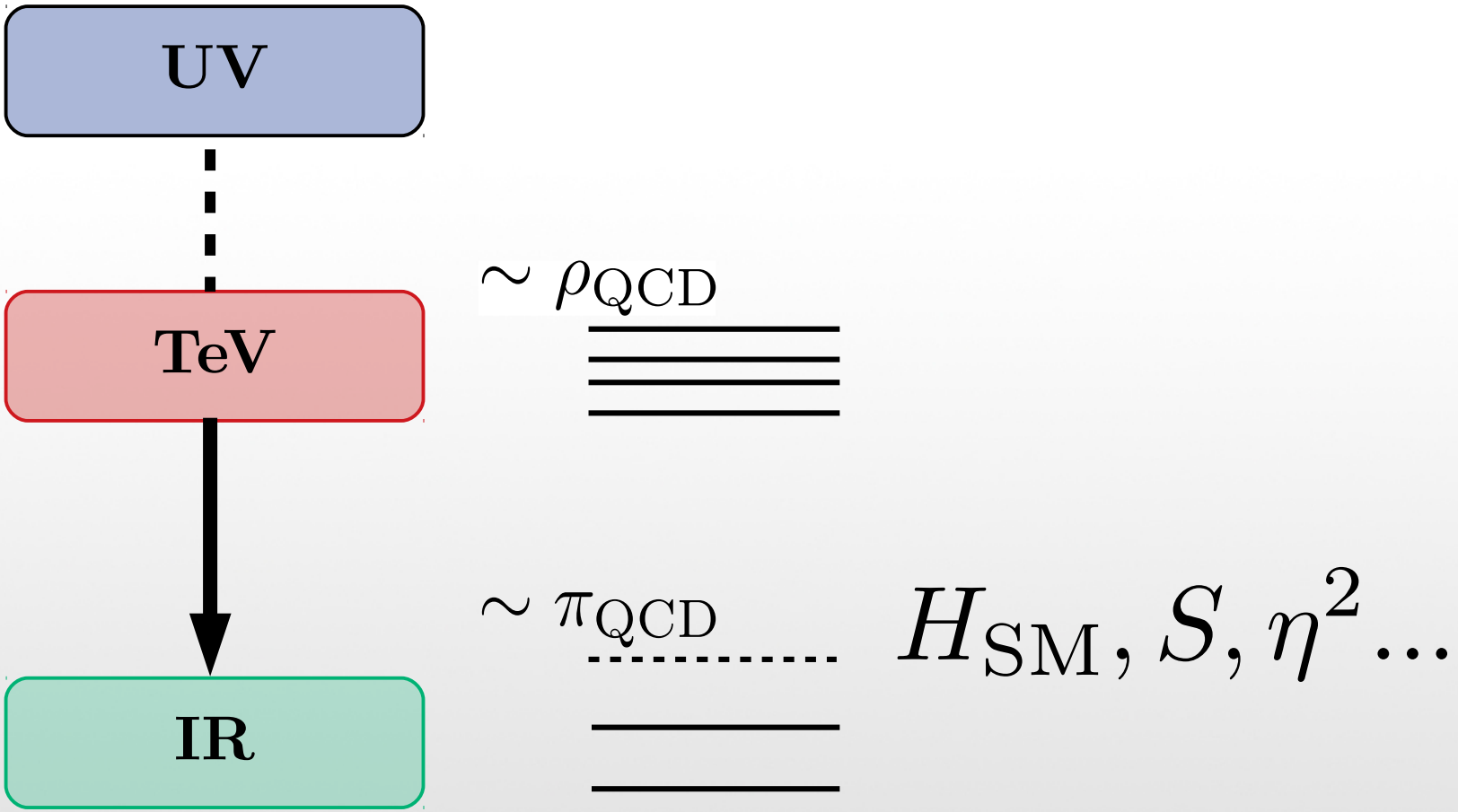
$\sim$ TeV

No longer a Higgs scalar at high energies

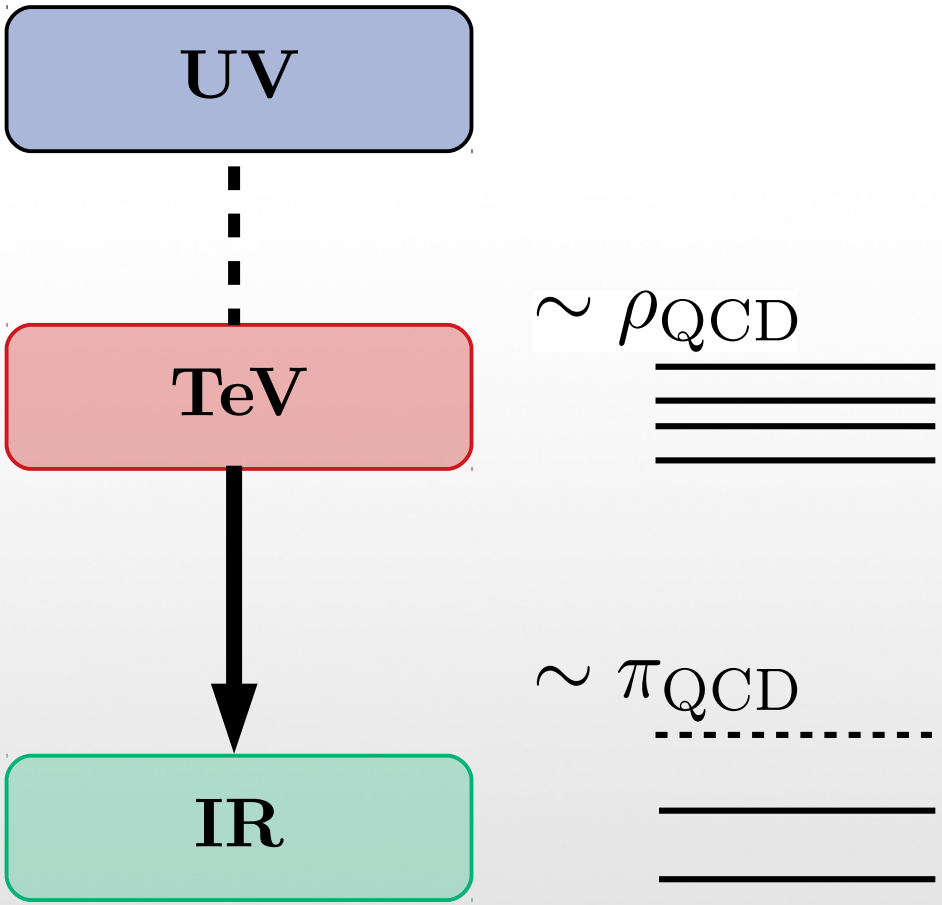


$$\delta m_H^2 \sim \frac{g^2}{(4\pi^2)} f_*{}^2$$

Non-minimal phenomenology



Non-minimal phenomenology



Strategy:

(i) prediction

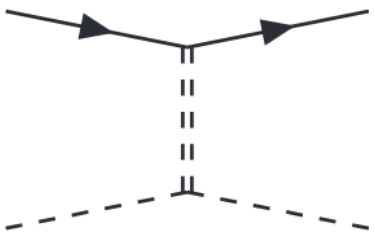
(ii) signals

(iii) new analysis

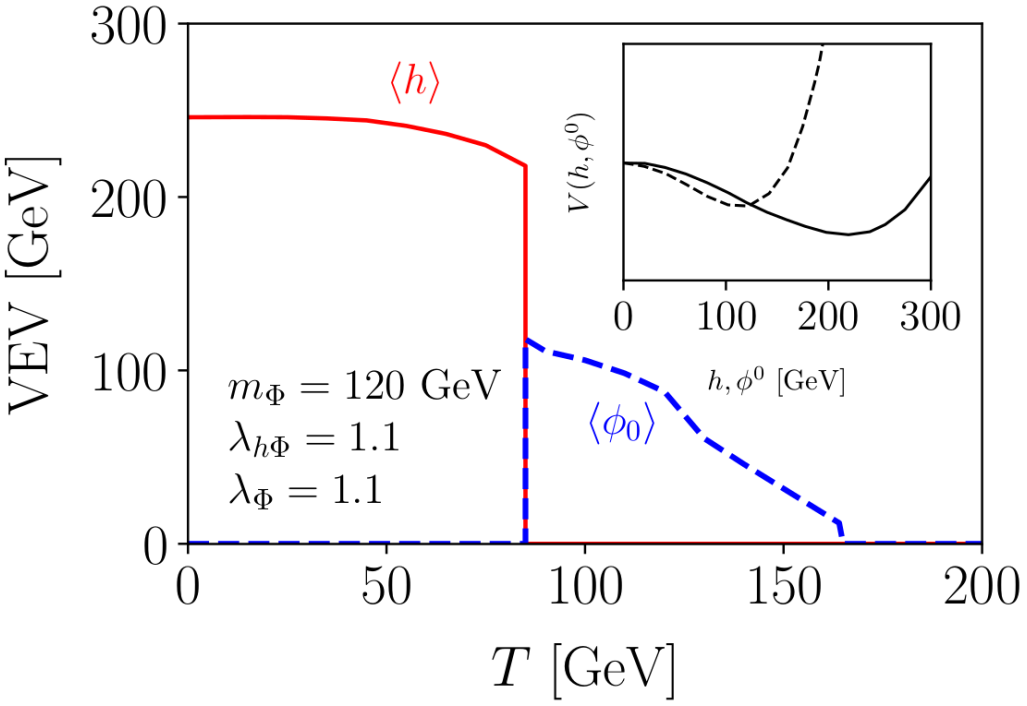
Signals of electroweak baryogenesis

Eur. Phys. J. C 79:156 (2019)

$\Phi_{(1,3)_0} \sim pseudoscalar$



$$\sim \frac{ic}{f}\overline{q_L}\,(H\Phi)\,u_R$$

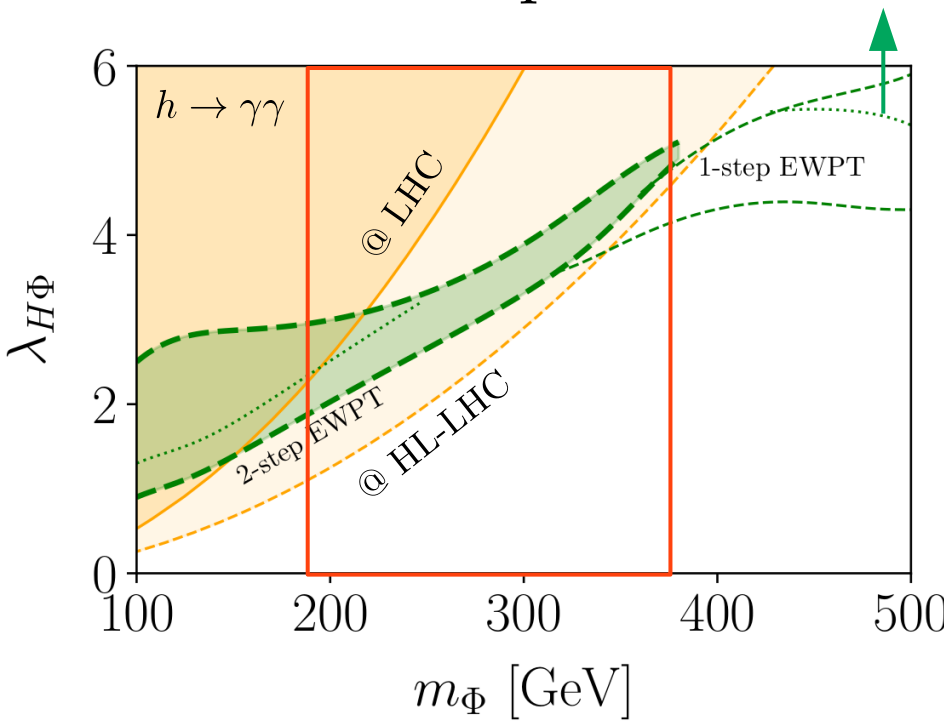


new collider phenomenology and might trigger baryogenesis

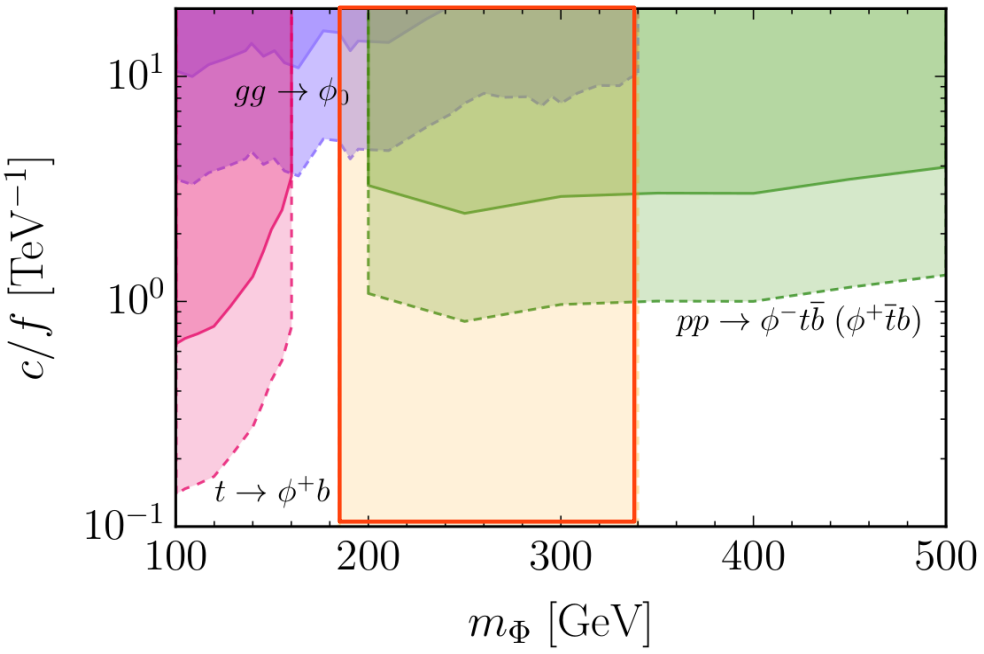
Signals of electroweak baryogenesis

Eur. Phys. J. C 79:156 (2019)

Prospects for LISA



LHC Searches



Signals of electroweak baryogenesis

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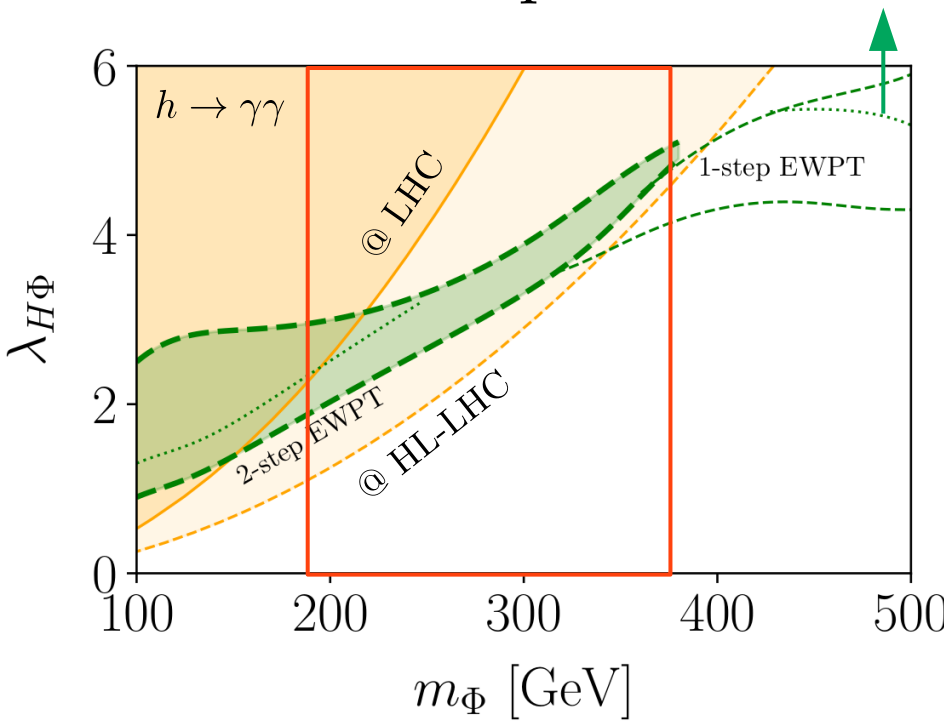
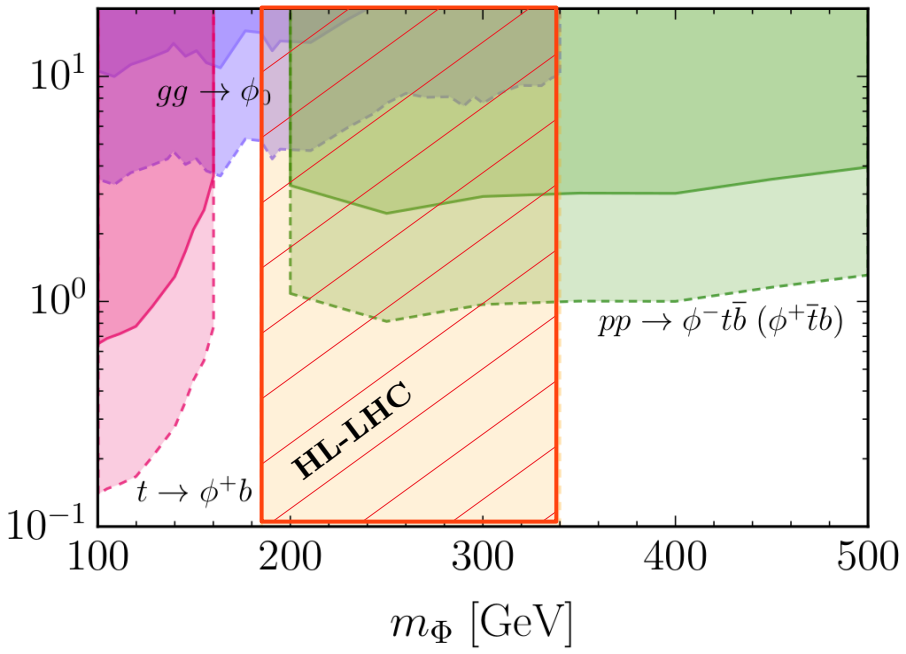


$pp \to \phi^\pm \phi^0 \to \bar{t}b(t\bar{b})\bar{b}b$



Novel signatures of composite dark matter

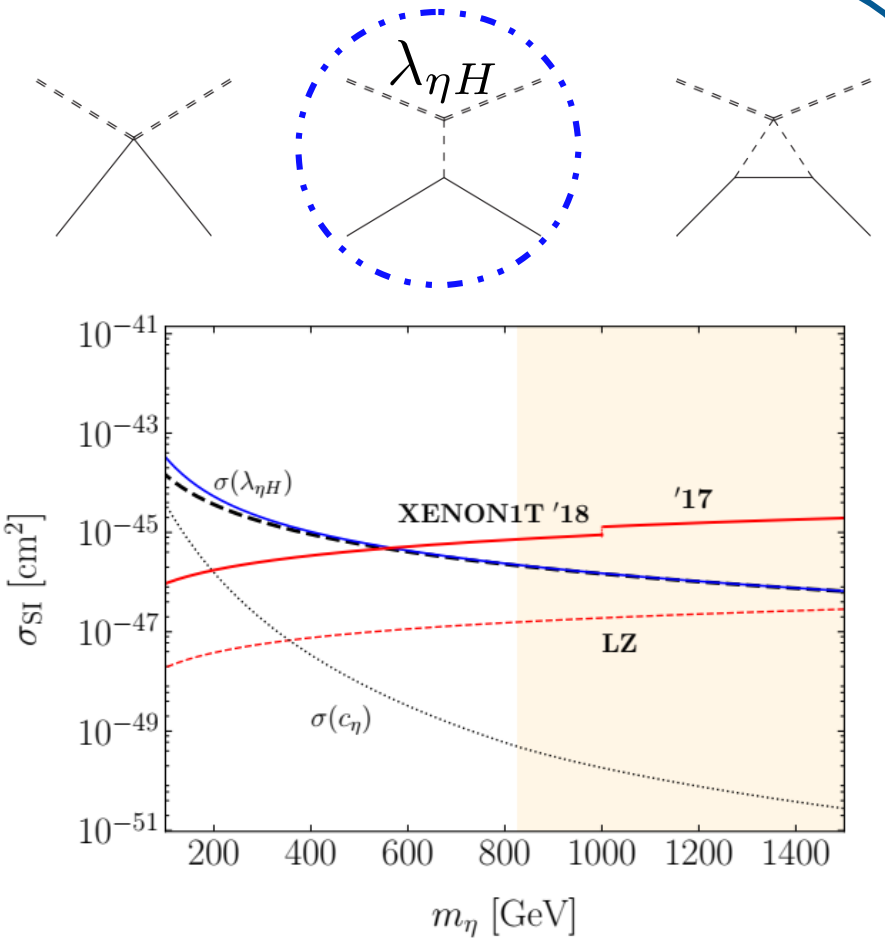
[1912.11061] (2019)

$$\Omega h^2 \approx 0.1 \left(\frac{\alpha_w^2 (200\text{GeV})^2}{\langle \sigma v \rangle} \right)$$

à la **WIMP**

Our prediction:

(extensively studied)



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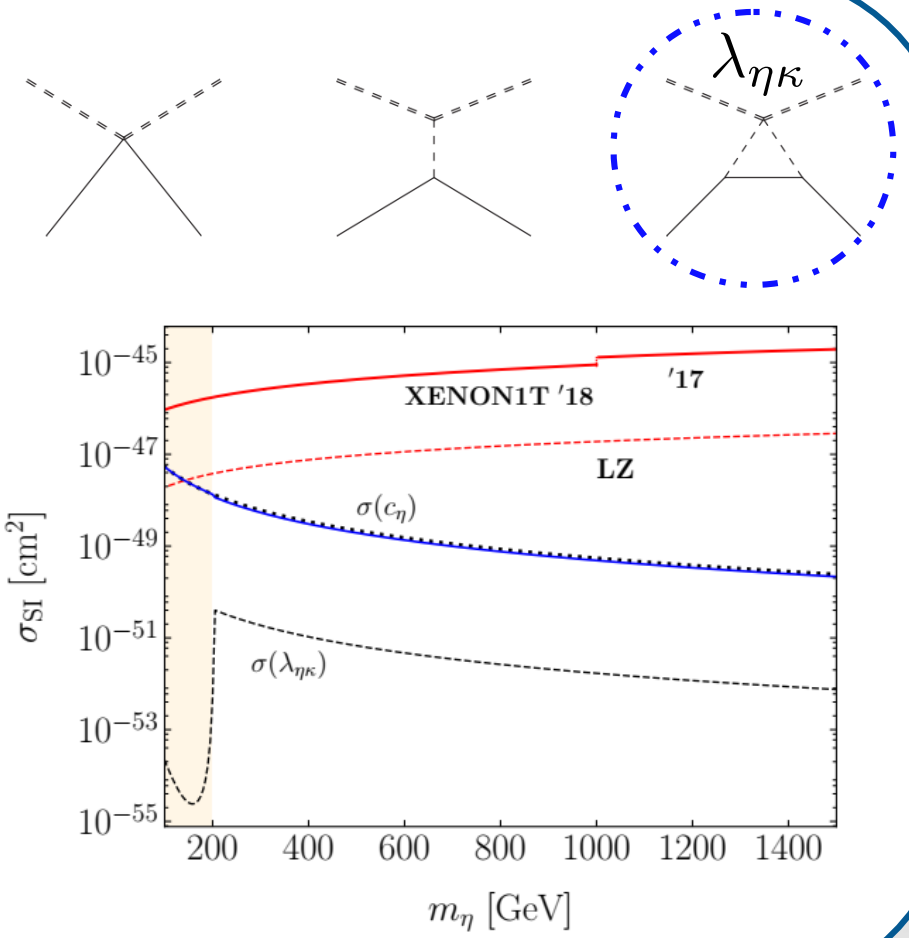
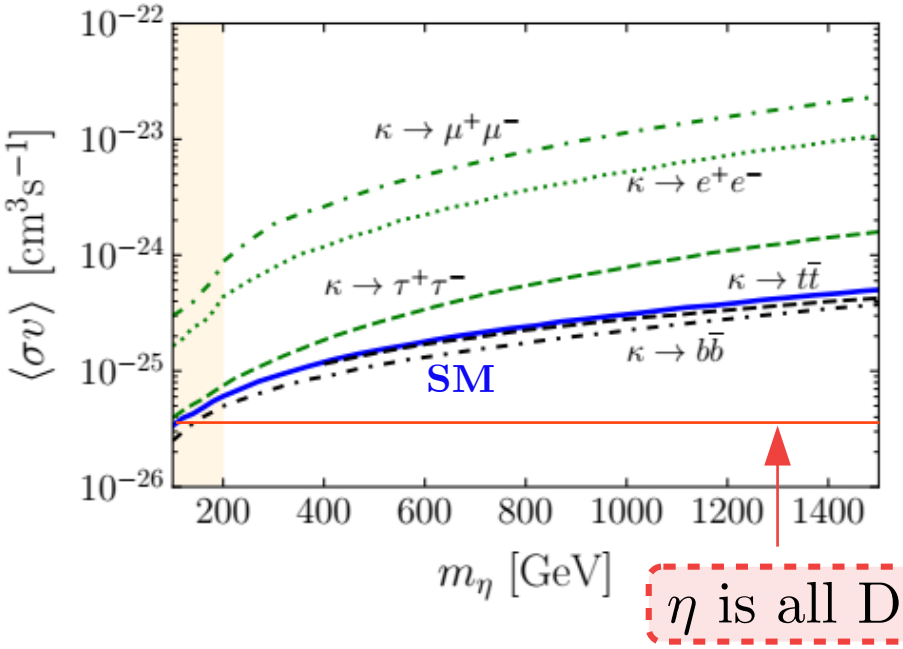


Novel signatures of composite dark matter

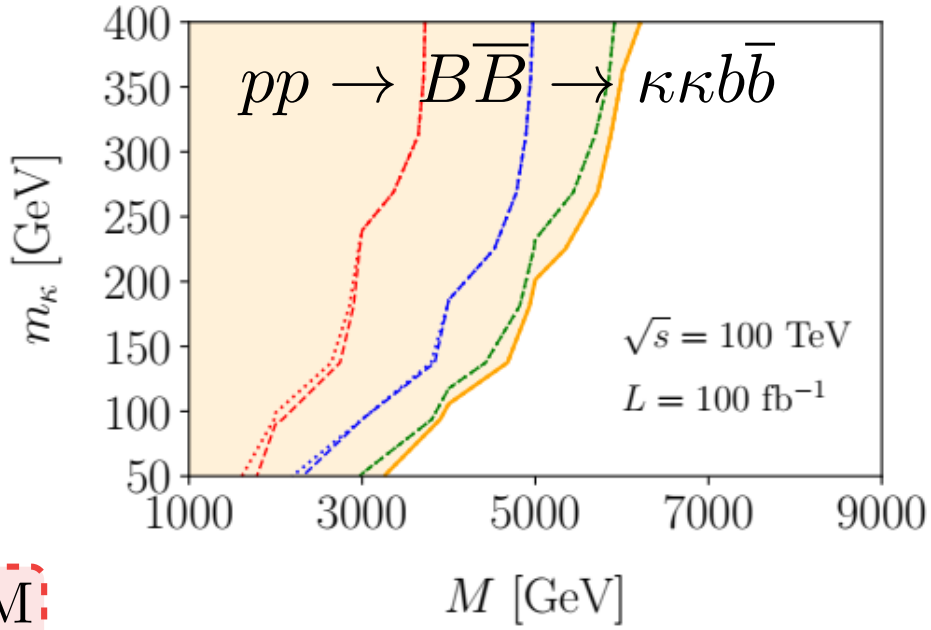
[1912.11061] (2019)

New Fermi-LAT limits



η is all DM

New collider searches



Thank you very much for your attention!

Check mine and Guilherme's posters :)

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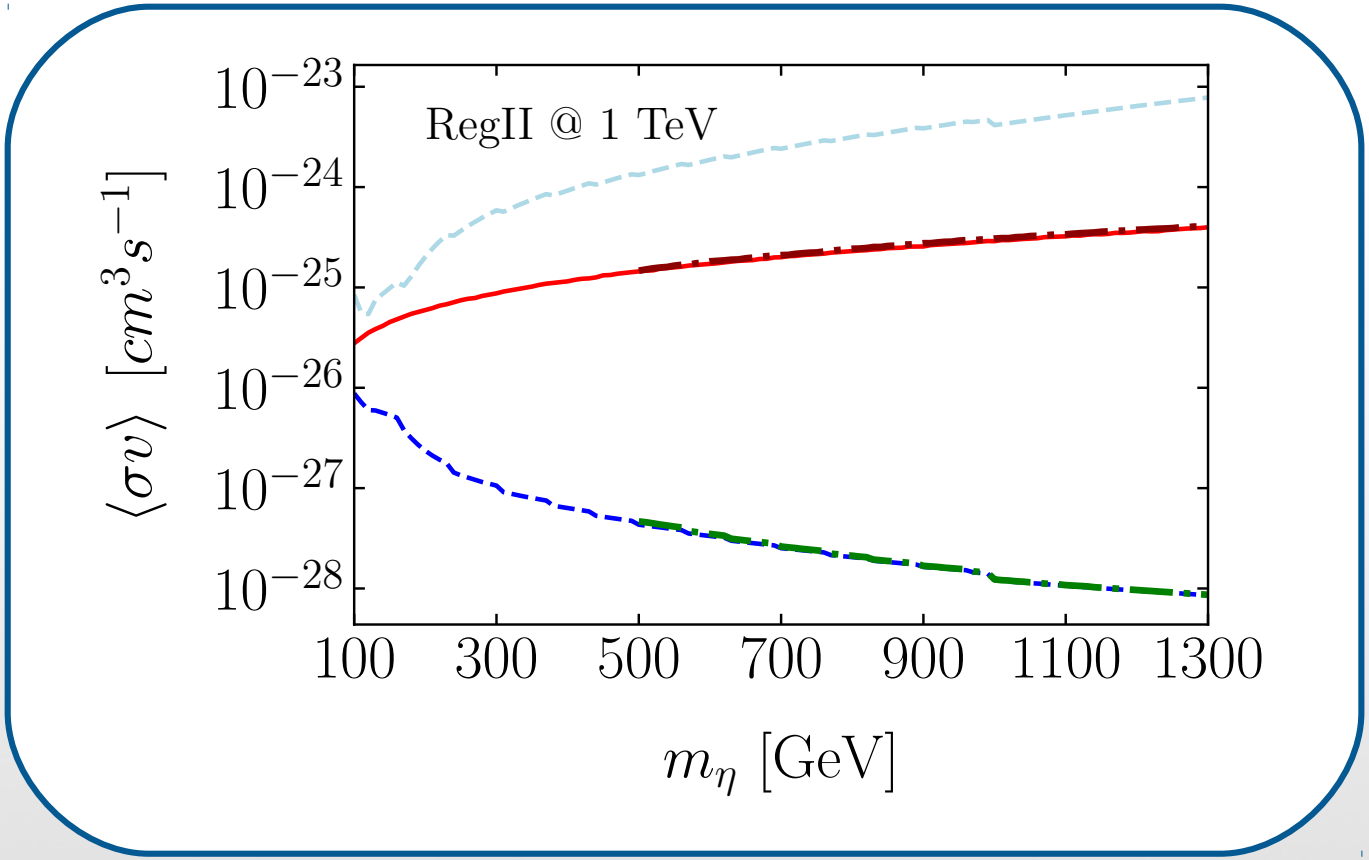
Novel signatures of composite dark matter

$$\Omega_\eta h^2 < \Omega_{obs} h^2$$



B-decay signatures of light scalars

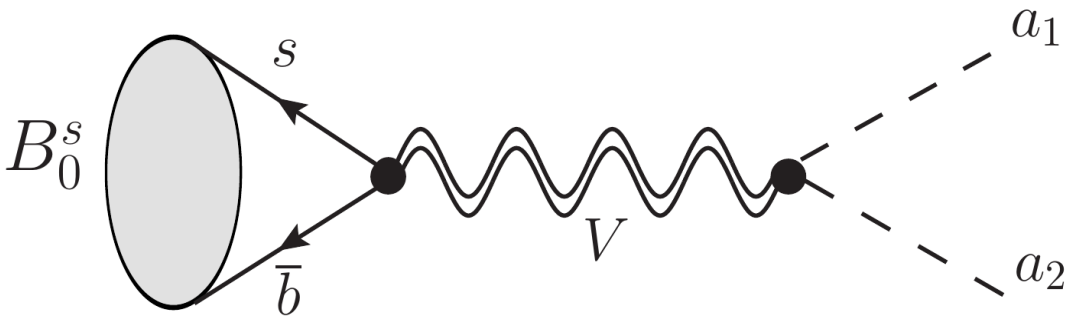
V^μ ——— $\sim$ TeV

a_2 - - - - - - $\ll$ TeV

a_1 - - - - - -

} CHMs

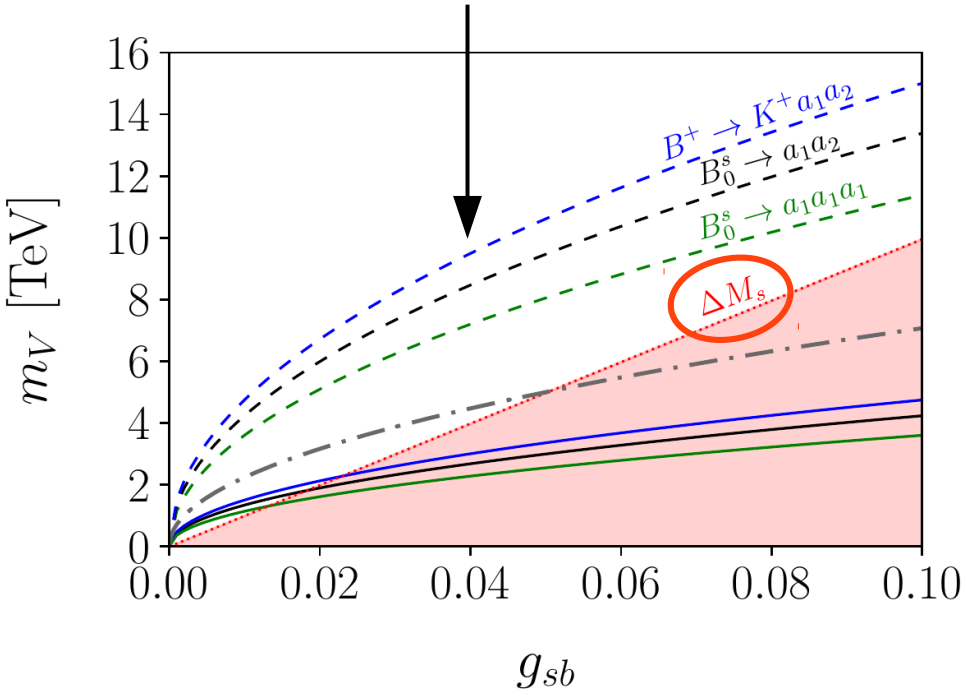
$\mathcal{L} \supset y_\ell a_{1,2} \ell^+ \ell^- + m^2_{1,2} a^2_{1,2} + a_2 a_1^2$



$3\mu^+ 3\mu^-$

B-decay signatures of light scalars

@ LHCb *upgradeII*



$$\Gamma\left(B_0^s \to a_1 a_2\right) \propto \frac{|m_2^2 - m_1^2|}{m_B}$$