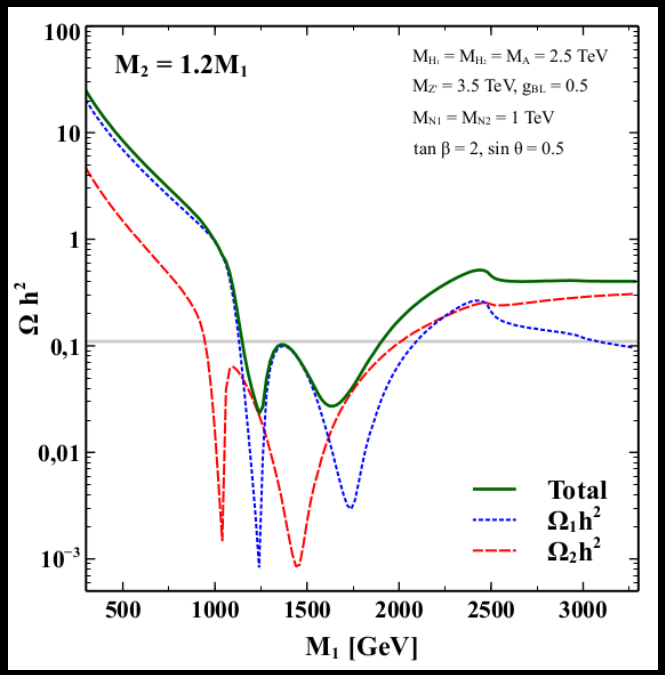
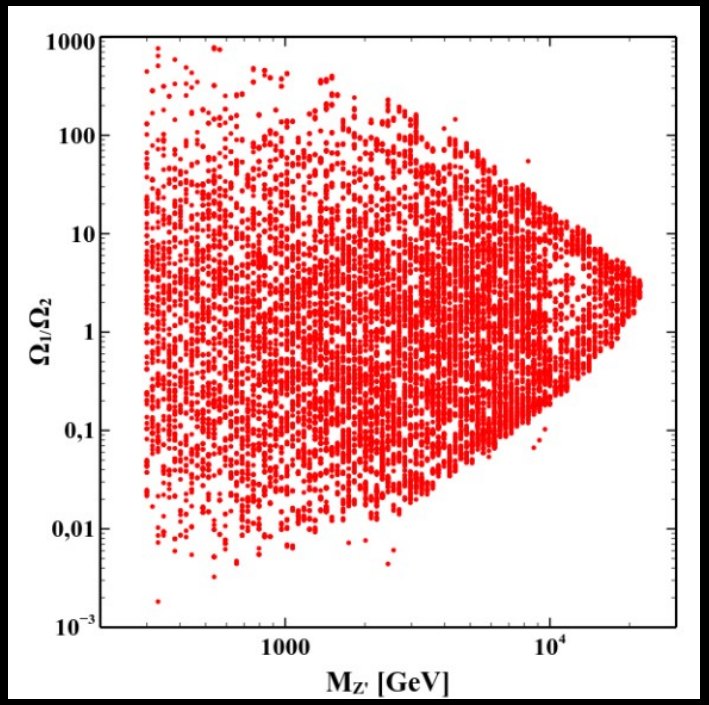
Two-component dark matter in a new B-L model





Based on 1808.03352

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Models based on B-L are a compelling alternative for physics beyond the SM

They include a new gauge boson (Z')

Signals at the LHC

They allow to explain neutrino masses

Via the seesaw

DM candidates can be incorporated

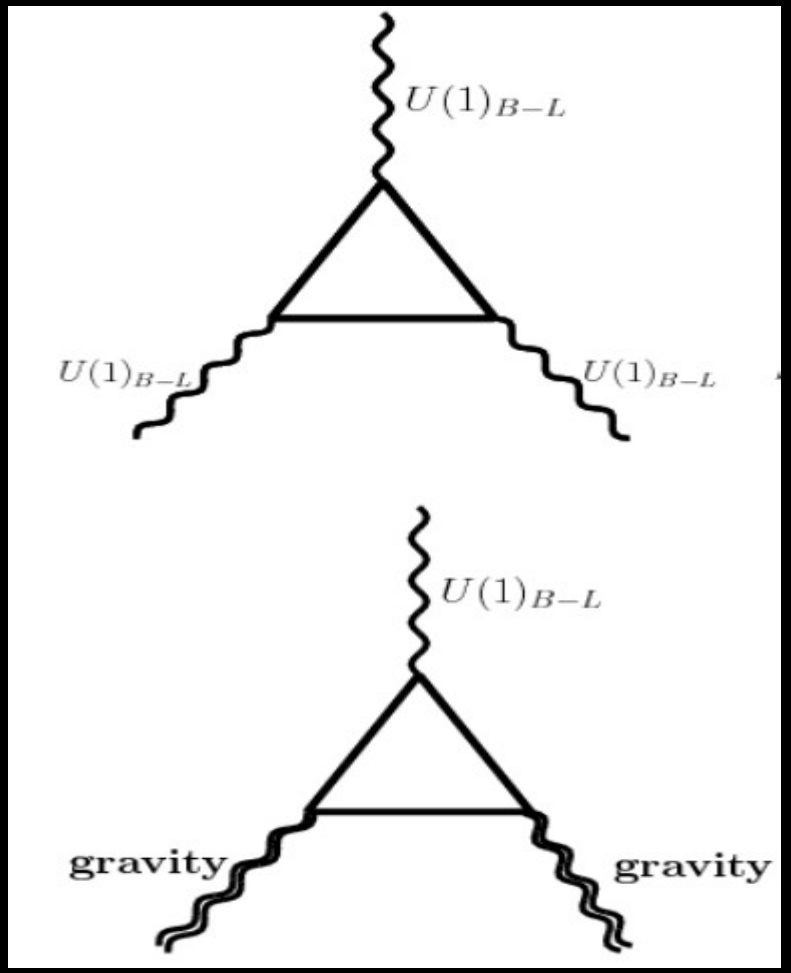
Fermion or Scalar

These models require new fermions to cancel the gauge anomalies

They must be SM singlets

Infinite solutions are possible

3 RH ν's is the most popular



We propose to cancel the anomalies with RH neutrinos and DM particles

Only 2 RH neutrinos are included

And 4 fermions with fractional charges

Two new scalar fields are also needed

Particles	$U(1)_{B-L}$	$(SU(3)_c,\ SU(2)_L,\ U(1)_Y)$
Q_{Li}	$1/3$	$(\mathbf{3},\ \mathbf{2},\ 1/6)$
u_{Ri}	$1/3$	$(\overline{\mathbf{3}},\ \mathbf{1},\ 2/3)$
d_{Ri}	$1/3$	$(\overline{\mathbf{3}},\ \mathbf{1},\ -1/3)$
L_i	-1	$(\mathbf{1},\ \mathbf{2},\ -1/2)$
e_{Ri}	-1	$(\mathbf{1},\ \mathbf{1},\ -1)$
N_{R1}	-1	$(\mathbf{1},\ \mathbf{1},\ 0)$
N_{R2}	-1	$(\mathbf{1},\ \mathbf{1},\ 0)$
ξ_L	$10/7$	$(\mathbf{1},\ \mathbf{1},\ 0)$
η_R	$-4/7$	$(\mathbf{1},\ \mathbf{1},\ 0)$
ζ_R	$-2/7$	$(\mathbf{1},\ \mathbf{1},\ 0)$
χ_L	$-9/7$	$(\mathbf{1},\ \mathbf{1},\ 0)$
H	0	$(\mathbf{1},\ \mathbf{2},\ 1/2)$
ϕ_1	1	$(\mathbf{1},\ \mathbf{1},\ 0)$
ϕ_2	2	$(\mathbf{1},\ \mathbf{1},\ 0)$

This model automatically includes two dark matter particles

The 4 fermions form 2 Dirac particles

$$\mathcal{L} \supset -a\,\overline{\xi_L}\,\eta_R\,\phi_2 - b\,\overline{\zeta_R}\,\chi_L\,\phi_1$$

Both are neutral and stable

Two DM particles

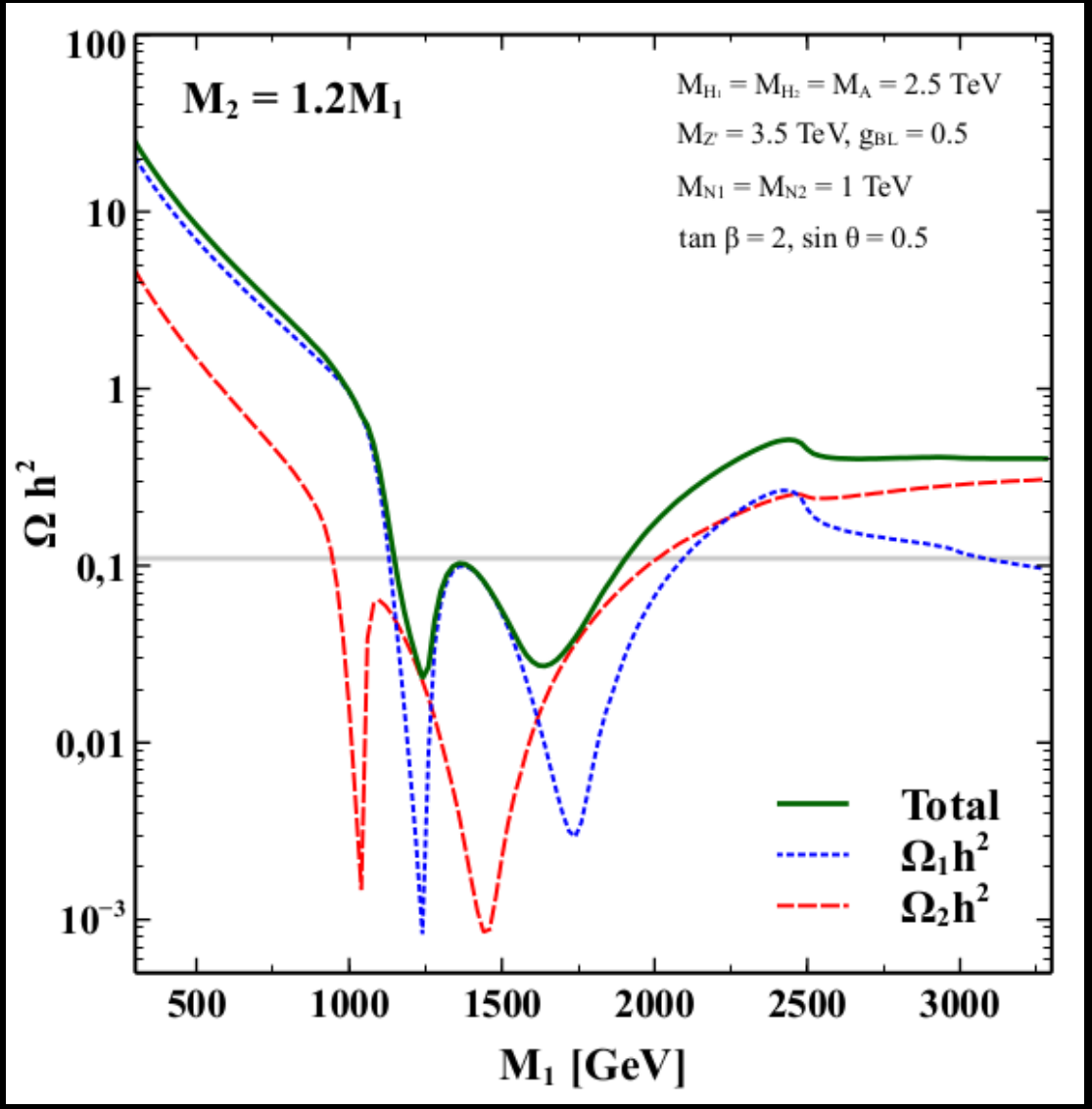
A two-component DM scenario is realized

Without any discrete simmetries

The observed dark matter density can be dominated by any of the two particles

Both DM particles contribute to Ω

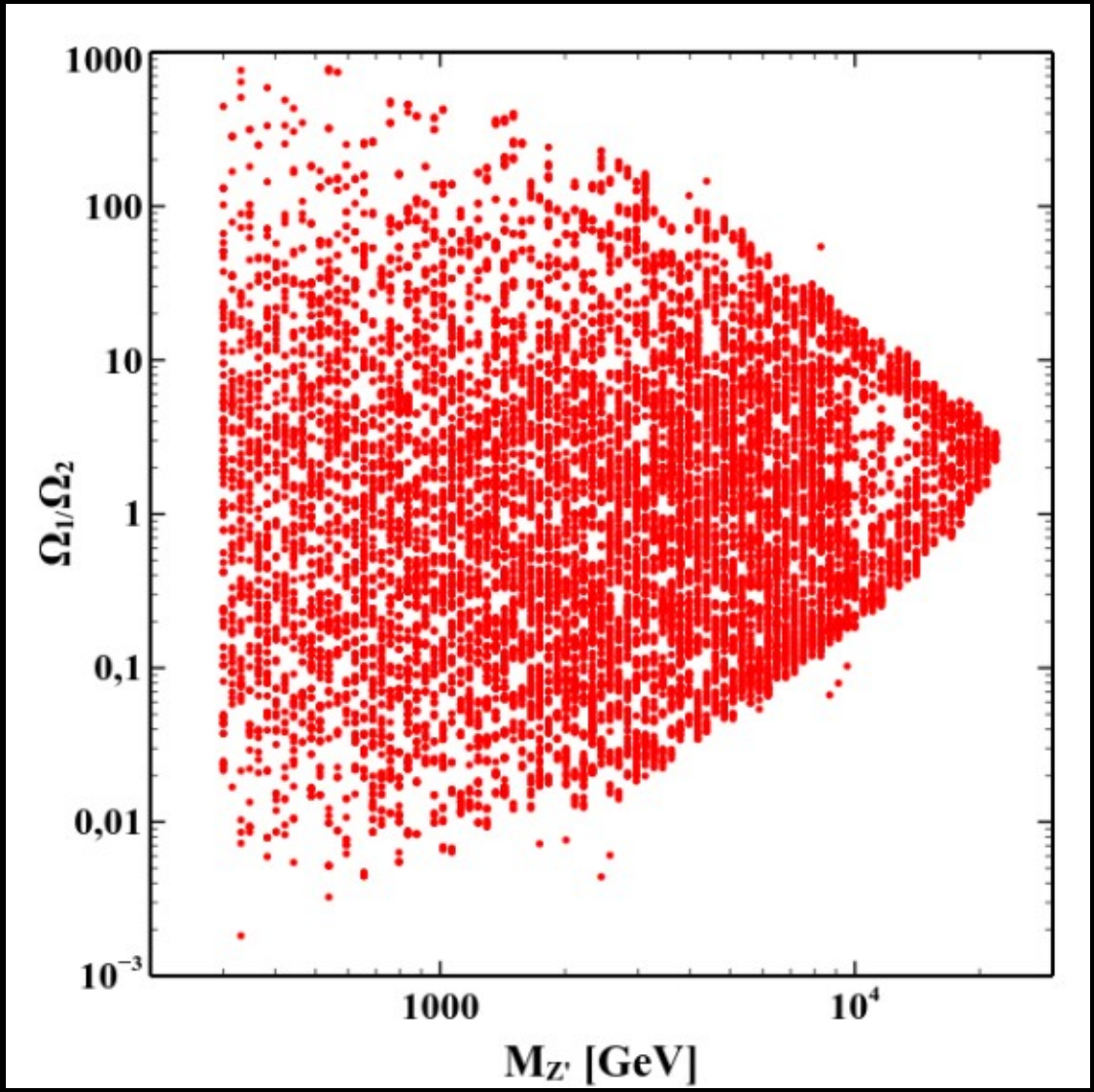
Their contributions vary significantly



For viable models, Ω_1 and Ω_2 are of the same order at large dark matter masses

At low M_{DM}, Ω_1/Ω_2 varies over a wide range

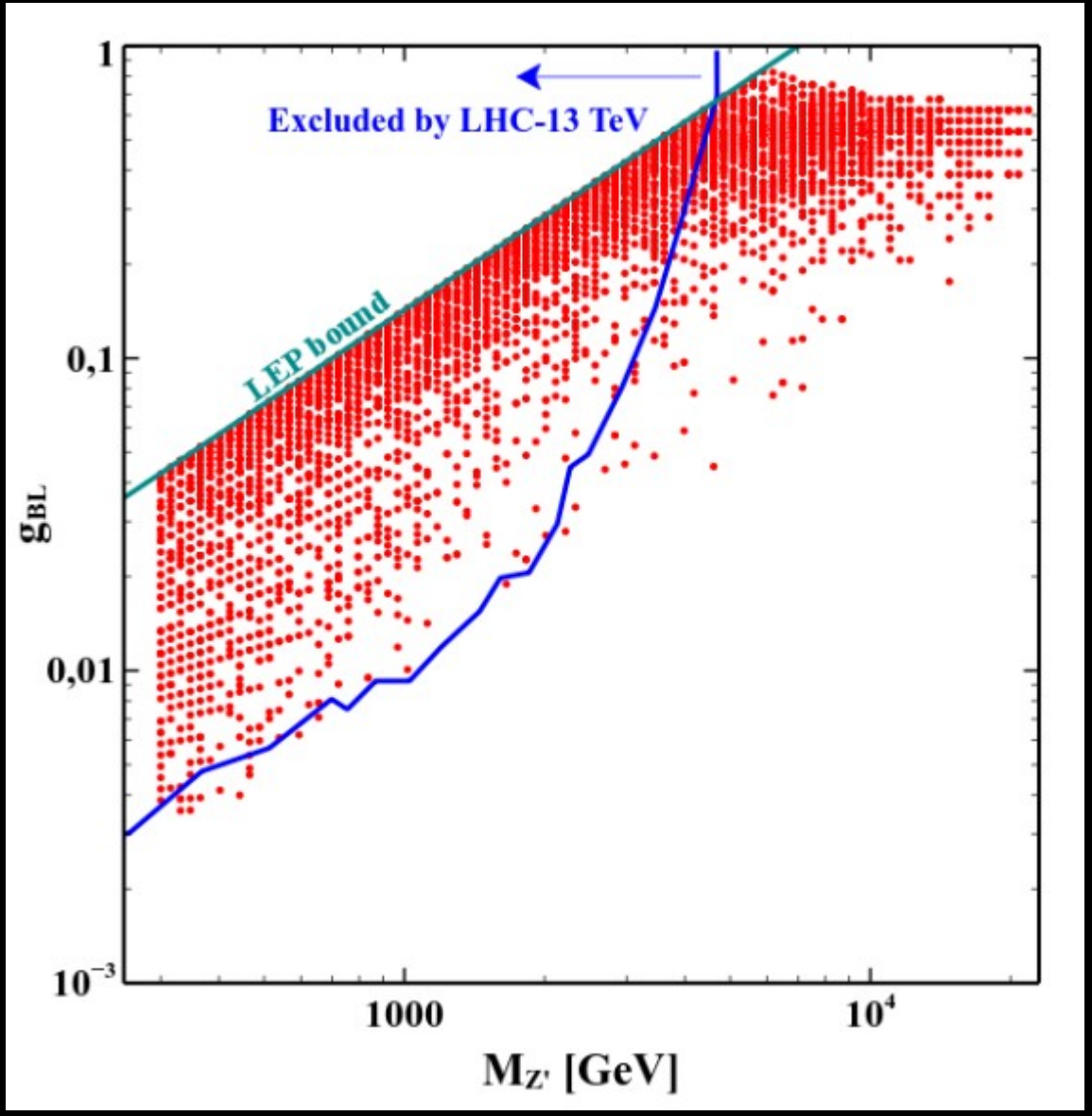
At high M_{DM}, Ω_1/Ω_2 tends to about 3



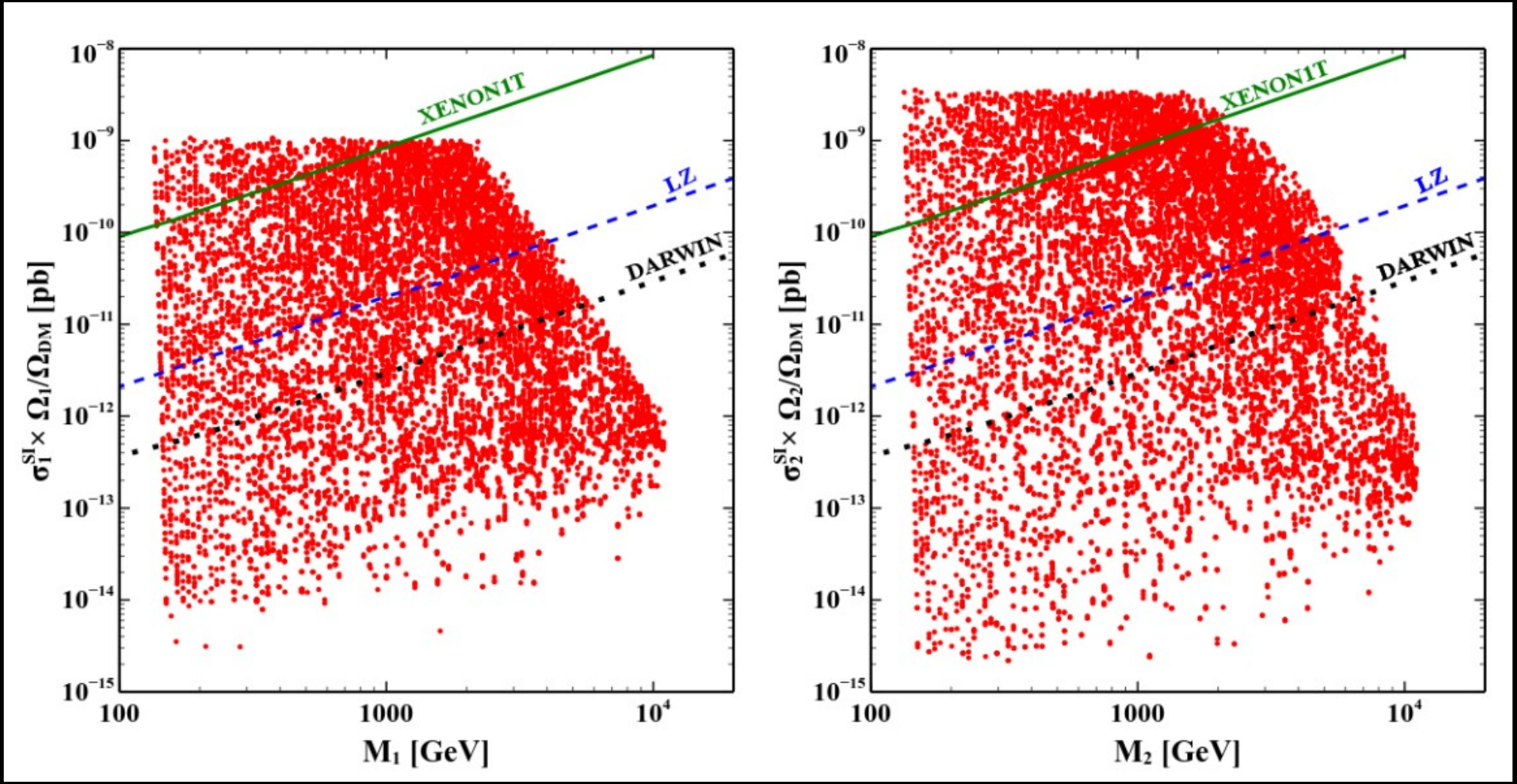
The LHC data severely restricts the low mass region of this model

Models with $M_{Z'} < 6$ TeV are nearly excluded

Viable models feature $M_{DM} > 3$ TeV



Future direct detection experiments will probe many viable models



We proposed an appealing extension of the SM based on the B-L gauge symmetry

It gives rise to a rich phenomenology

It contains two DM particles

It is being probed by current experiments

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Dark Matter and Weak Interactions (DARKWIN) Conference

Dark Matter
Neutrino Physics
Model Building
Collider Physics

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