Abelian gauge extensions with Higgs mixing

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In collaboration with
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and Carlos Yaguna (UPTC) [*In progress...*]

Systematic study of the d=5 Weinberg operator at one-loop order #1

Florian Bonnet (Wurzburg U.), Martin Hirsch (Valencia U., IFIC), Toshihiko Ota (Munich, Max Planck Inst.), Walter Winter (Wurzburg U.) (Apr, 2012)

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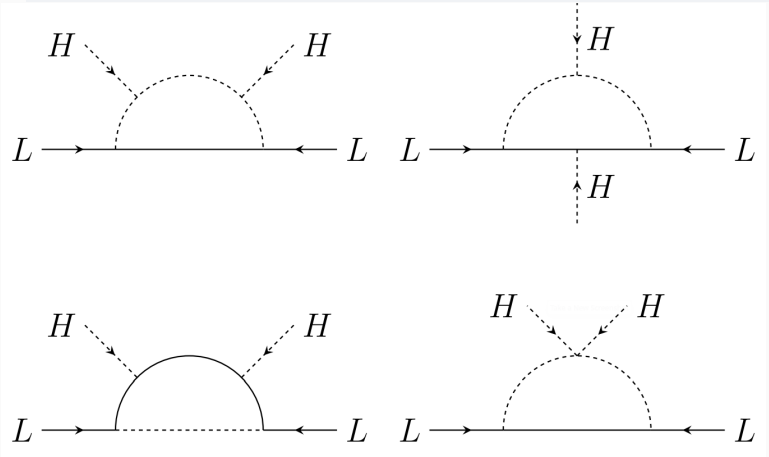

Figure 1. The four different 1-loop diagrams that can lead to genuine neutrino mass models [15]. Top line: T-I-1 (left) and T-I-2 (right), bottom T-I-3 (left) and T-3 (right).

Up to electro-weak triplets
(Color singlets)

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$$-i\Sigma^{\nu}_{ij}(p) = \int \frac{d4k}{(2\pi)^4} \left(y_{in\alpha}\right) iS_F(k) \left(y_{jn\alpha}\right) i\Delta_F(p+k)$$

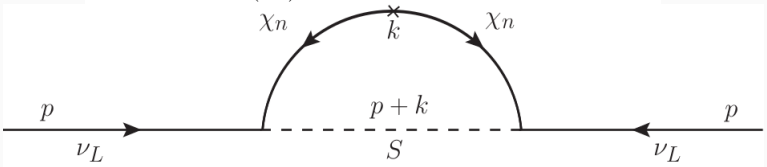

Figure 9.1: Generic one-loop neutrino mass contribution

Up to electro-weak triplets
(Color singlets)

$$M^{\nu}_{ij} = -\frac{y_{in\alpha} y_{jn\alpha}}{16\pi^2} m_{\chi_n} \left[\mathrm{cte}(\infty) + f\left(m_{\chi_n}, m^2_{S_\alpha}\right)\right]$$

where

$$f\left(m^2_{\chi_n}, m^2_{S_\alpha}\right) = \frac{m^2_{S_\alpha} \ln\left(m^2_{S_\alpha}\right) - m^2_{\chi_n} \ln\left(m^2_{\chi_n}\right)}{m^2_{\chi_n} - m^2_{S_\alpha}}$$

Hirsch-subindex → In the Acknowledgements section

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ft "martin hirsch" and a AUTHOR
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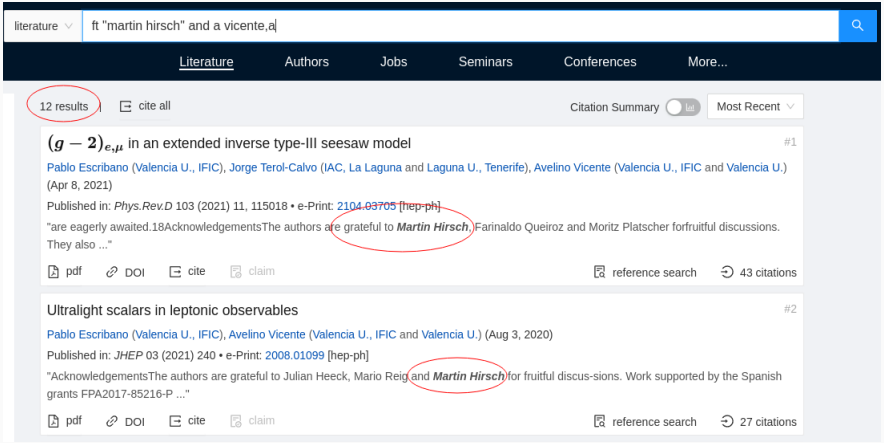

José W.F. Valle 16 Avelino Vicente 12 Diego Aristizabal 7 Diego Restrepo 7

Models with radiative neutrino masses and viable dark matter candidates #9

Diego Restrepo (Antioquia U.), Oscar Zapata (Antioquia U.), Carlos E. Yaguna (Munster U., ITP) (Aug 16, 2013)

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"Diego Aristizabal for helpful discussions.O.Z. is also very grateful to ***Martin Hirsch*** for his enlightening discussions.References[1] Planck Collaboration Collaboration ..."

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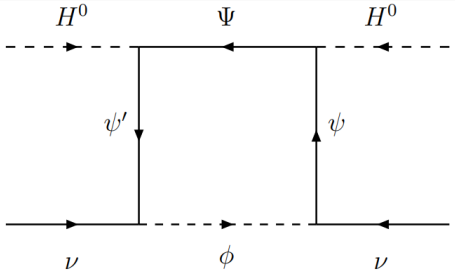

Figure 3. One-loop contribution to neutrino mass in the T1-3 models.

Ψ	ψ'	ϕ	ψ
1^F_α	$2^F_{1+\alpha}$	1^S_α	$2^F_{\alpha-1}$

Table 19. Model T1-3-A.

Up to electro-weak triplets
(Color singlets)
Result: 35 models

SARAH / Models / SSDM / SSDM.m

restrepo 4.6.0

Code | Blame | Executable File · 109 lines (68 loc) · 2.68 KB

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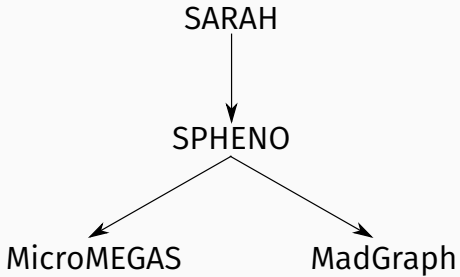

Radiative neutrino masses in the singlet-doublet fermion dark matter model with scalar singlets

Diego Restrepo(Antioquia U.), Andrés Rivera(Antioquia U.), Marta Sánchez-Peláez(Antioquia U.), Oscar Zapata(Antioquia U.), Walter Tangarife(Tel Aviv U.)

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TABLE I. α set of scalars and Weyl fermions of the model.

Symbol	$(SU(2)_L, U(1)_Y)$	Z_2	Spin
S_α	(1,0)	−	0
N	(1,0)	−	1/2
$\tilde{R}_u$,	$(2,+1/2)$	−	1/2
R_d	$(2,-1/2)$	−	1/2

Like the MSSM bino-Higgsino sector (arbitrary couplings)

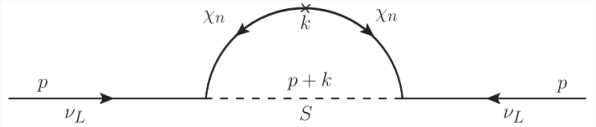

FIG. 1. One-loop Weyl-spinor Feynman rules [29] for the contributions to the neutrino mass, with three Majorana fermions ($n = 1, 2, 3$) and a singlet scalar S.

Conclusion

The mass mixing must be taking into account to calculate the dark matter-nucleon scattering cross-section