Introduction - Summary - Outlook

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20. November 2015

Education

Dual Bachelor

Fourieranalysis on tempered distributions

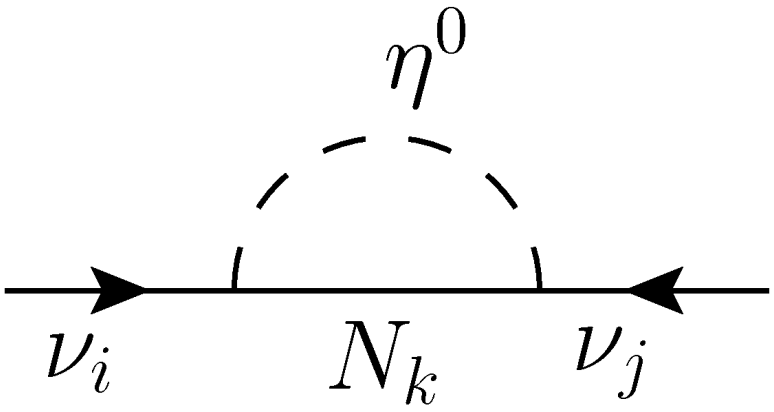
Master

Fermionic singlet and two-component dark matter

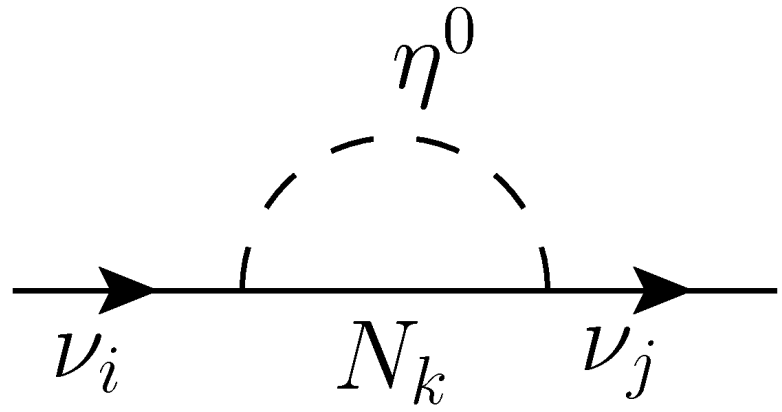
Ph.D Student since 10/2014

Global analysis of minimal models

Neutrino masses in the scotogenic model

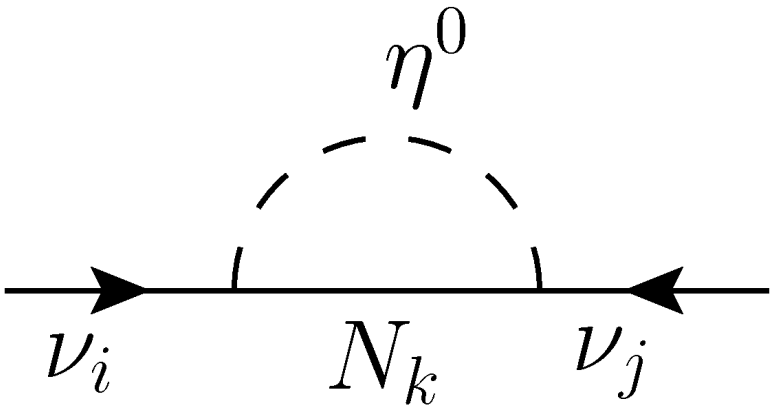


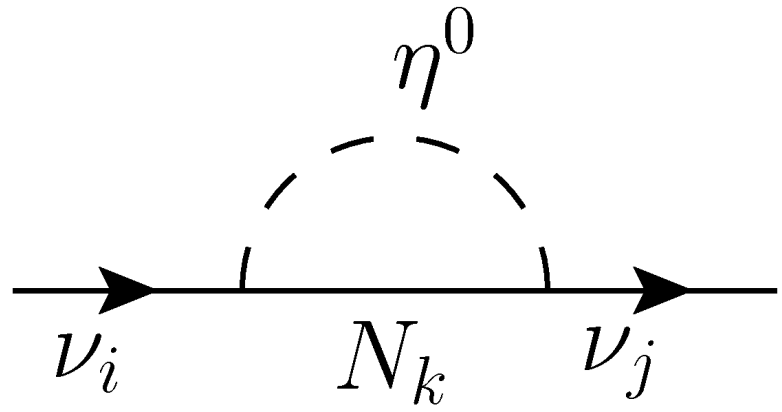
Majorana neutrino mass generation



Vanishing Dirac mass contribution

Neutrino masses in the scotogenic model



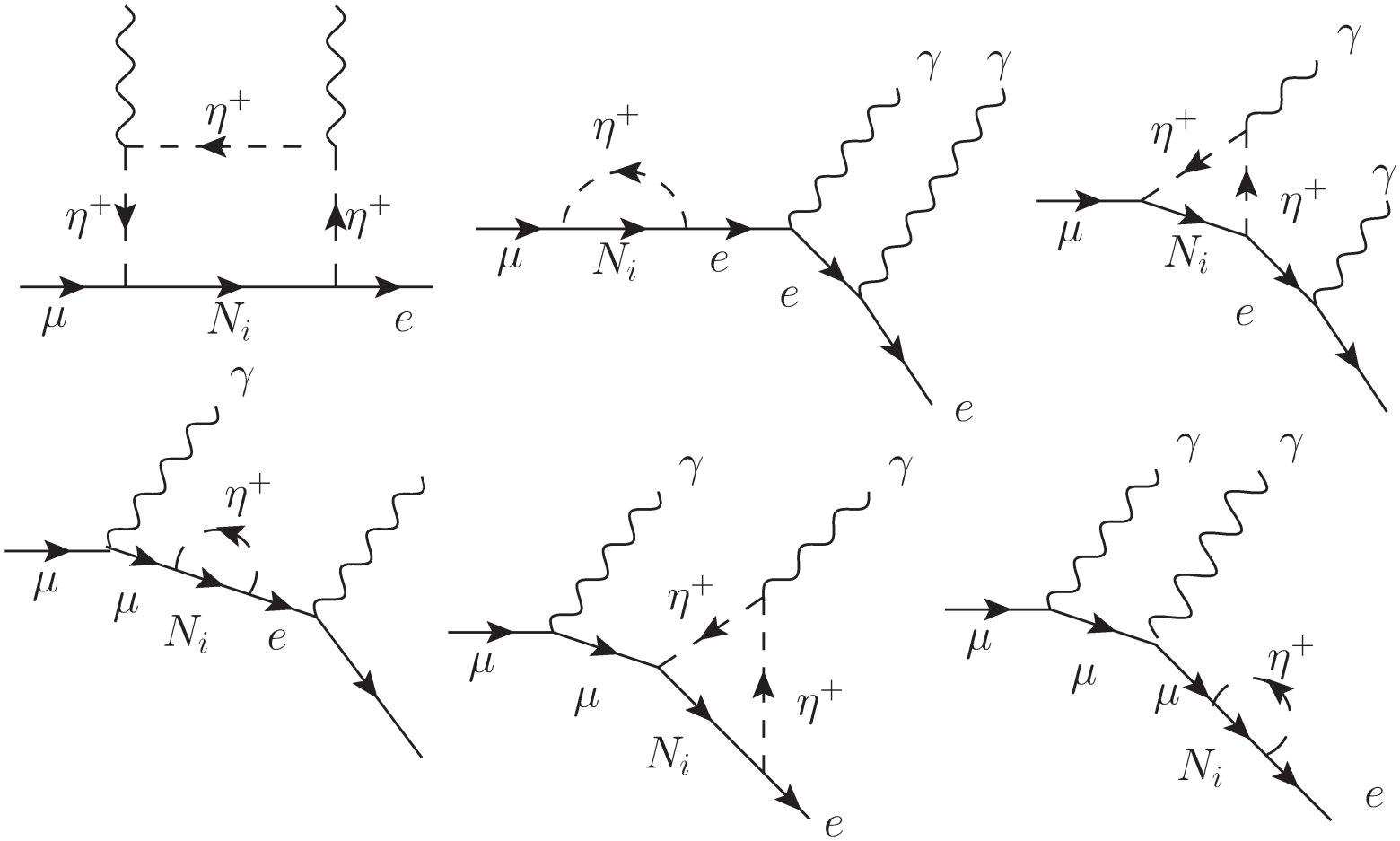


Majorana neutrino mass generation

Vanishing Dirac mass contribution

$$(M_\nu)_{ij} = \sum_k \frac{y_{ik} y_{jk}}{16\pi^2} M_k \left(\frac{m_R^2}{M_k^2 - m_R^2} \ln\left(\frac{m_R^2}{M_k^2}\right) - \frac{m_I^2}{M_k^2 - m_I^2} \ln\left(\frac{m_I^2}{M_k^2}\right) \right)$$

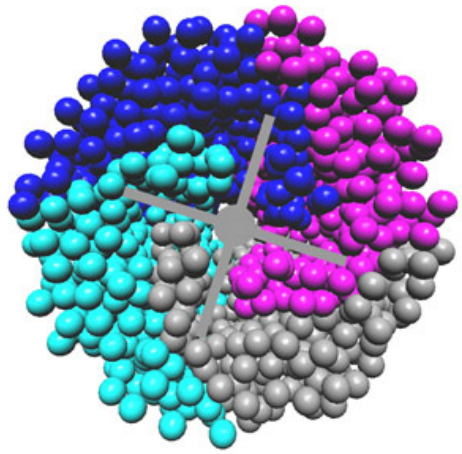
Lepton flavor violation



Singlet doublet scalar dark matter

Additional fields

- Scalar singlet S_S
- Scalar doublet D_S



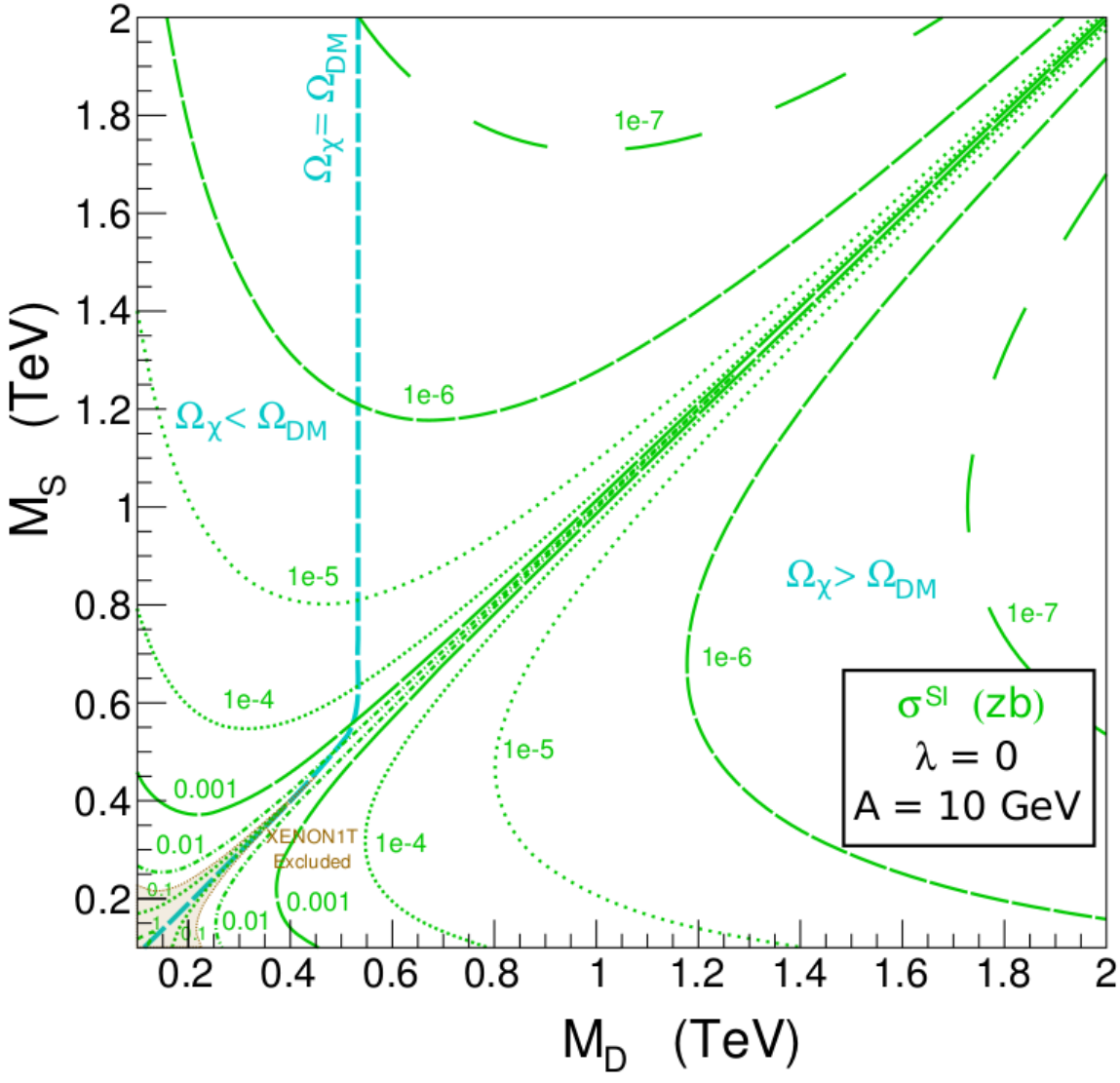
- mixing matrices
- model implemented with SARAH
- direct detection cross section with micrOMEGAs
- relic density with micrOMEGAs

[SARAH - F.Staub arxiv:0806.0538 [hep-ph]]

[G. Bélanger, F. Boudjema, A. Pukhov, A. Semenov, arXiv:1407.6129 [hep-ph]]

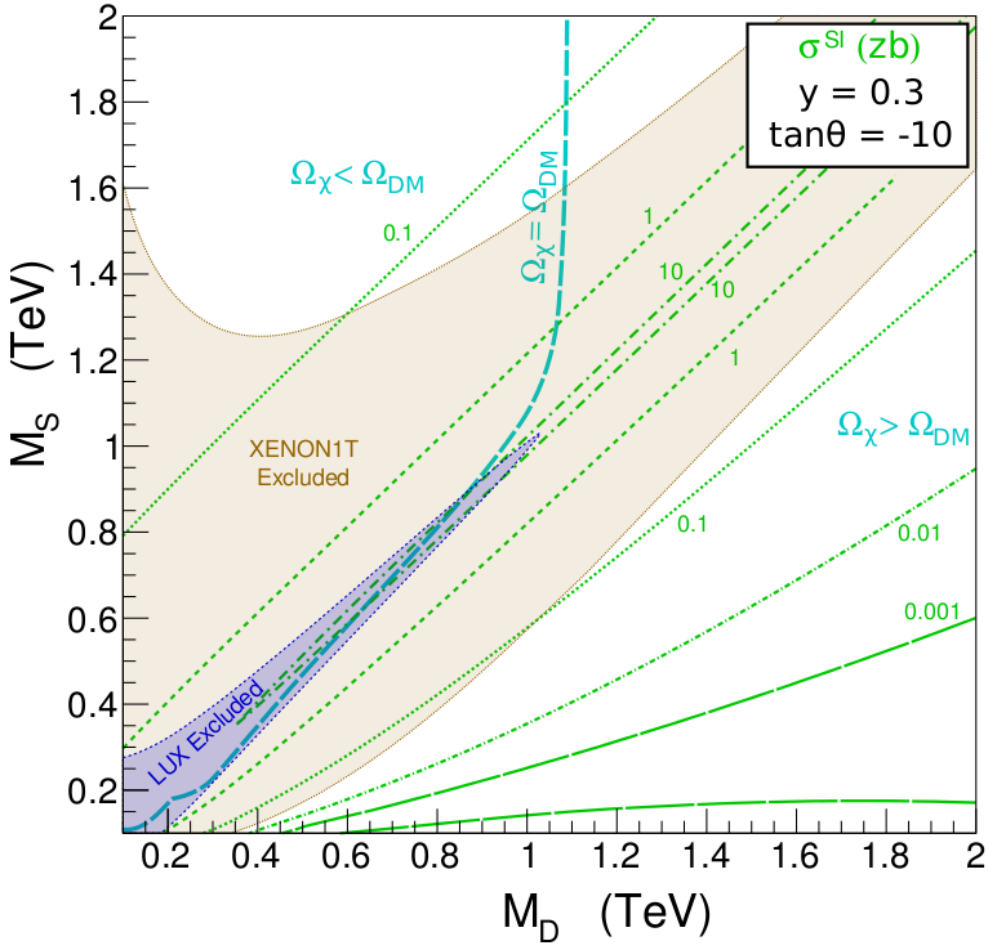
[http://www.nist.gov/itl/math/images/10ITL005_rheom_flow_LR.jpg]

Reproduce Results



[C. Cheung, D. Sanford,arXiv:1311.5896]

Singlet doublet fermion dark matter



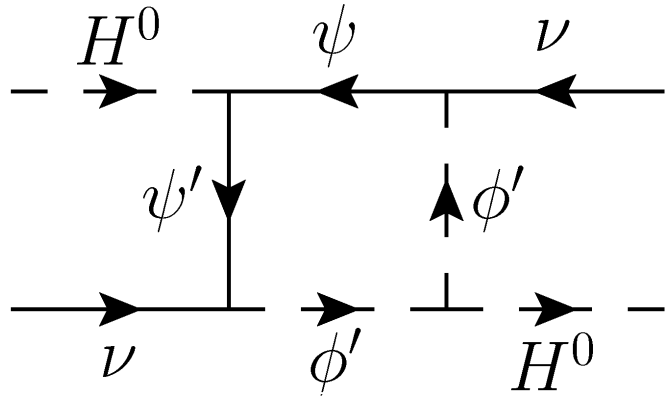
- Fermionic singlet S_F
- Fermionic doublet D_F

[C. Cheung, D. Sanford,arXiv:1311.5896]

T12A

Combine scalar and fermion

- fermionic singlet S_F
- fermionic doublet D_F
- scalar single S_S
- scalar doublet S_D



Majorana neutrino masses

- mixing matrices ✓
- model implemented in SARAH ✓
- limits of singlet doubler scalar or fermion dark matter ✓
- analytic expression for neutrino masses ✓
- ongoing: check of neutrino masses and mixings

[D.Restrepo, O.Zapata, C.Yaguna, arXiv:1308.3655 [hep-ph]]

Outlook

- analysis of T12A regarding relic density and direct detection regarding experimental constraints
- Monte Carlo Markov chain for other ν-mass models
- loop corrections for $\chi\chi \to qq$
- electro weak corrections on one-loop level
- minimal model including important loop effects
- combination minimal models and routines from DM@NLO
- combined analysis including LHC constraints
- global neutrino analysis including mixing and mass differences as input