

# The 26th International Workshop on Weak Interactions and Neutrinos (WIN2017)

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Type: **Working Group Sessions**

## Neutrino Mass Models

*Friday, 23 June 2017 11:35 (15 minutes)*

I will give a summary of 3 projects that I have worked on:

### 1) Dark Gauge $U(1)$ Symmetry for an Alternative Left-Right Model

An alternative left-right model of quarks and leptons, where the  $SU(2)_R$  lepton doublet  $(\nu, l)_R$  is replaced with  $(n, l)_R$  so that  $n_R$  is not the Dirac mass partner of  $\nu_L$ , has been known since 1987. Previous versions assumed a global  $U(1)_S$  symmetry to allow  $n$  to be identified as a dark-matter fermion (scotino). We propose here a gauge extension by the addition of extra fermions to render the model free of gauge anomalies, and just one singlet scalar to break  $U(1)_S$ . This results in two layers of dark matter, one hidden behind the other.

This is the gauged version of the arXiv:0901.0981, arXiv:1002.0692

### 2) Gauge $U(1)_R$ Family Symmetry and Scotogenic Fermion Masses

SM is extended by a  $U(1)_R$  Gauge Family Symmetry under which only Right handed fermions are charged. 3'rd family masses are generated at the tree level, to generate masses for the other 2 families we utilize scotogenic mechanism via introduction of extra particles in the dark sector.

### 3) Scotogenic Inverse Seesaw model of Neutrino mass

A variation of the original 2006 radiative seesaw model of neutrino mass through dark matter is shown to realize the notion of inverse seesaw naturally. The dark-matter candidate here is the lightest of three real singlet scalars which may also carry flavor.

4) I might also talk on the Neutrino Mass generated radiatively by the non-Abelian Vector Dark Matter.

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