Contribution ID: **56** Type: **Contributed talk**

Dark matter from the vector of SO (10)

Thursday 28 July 2016 18:15 (15 minutes)

Summary

SO(10) grand unified theories can ensure the stability of new particles in terms of the gauge group structure itself, and in this respect are well suited to accommodate dark matter (DM) candidates in the form of new stable massive particles. We introduce new fermions in two vector 10 representations. When SO(10) is broken to the standard model by a minimal 45 + 126 + 10 scalar sector with $SU(3)_C \otimes SU(2)_L \otimes SU(2)_R \otimes U(1)_{B-L}$ as intermediate symmetry group, the resulting lightest new states are two Dirac fermions corresponding to combinations of the neutral members of the $SU(2)_L$ doublets in the 10's, which get splitted in mass by loop corrections involving W_R. The resulting lighter mass eigenstate is stable, and has only non-diagonal $Z_{L,R}$ neutral current couplings to the heavier neutral state. Direct detection searches are evaded if the mass splitting is sufficiently large to suppress kinematically inelastic light-to-heavy scatterings. By requiring that this condition is satisfied, we obtain the upper limit M_{W_R}
$lesssim$25 TeV.

Based on (arXiv number)

1511.02524

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Session Classification: Dark Matter Models

Track Classification: Dark Matter Models