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## A Study of Dirac Fermionic Dark Matters

We study pure weak eigenstate Dirac fermionic dark matters (DM). We consider WIMP with renormalizable interaction. According to results of direct searches and the nature of DM (electrical neutral and being a pure weak eigenstate), the quantum number of DM is determined to be  $T_3 = Y = 0$ . There are only two possible cases: either DM has non-vanishing weak isospin ( $T \neq 0$ ) or it is an isosinglet ( $T = 0$ ). In the first case, we obtain large  $\chi\bar{\chi} \rightarrow W^+W^-$  cross section, which is comparable to the latest bounds from indirect searches and  $m_\chi$  is constrained to be larger than few hundred GeV to few TeV. It is possible to give correct relic density with  $m_\chi$  higher than these lower bounds. In the second case, to couple DM to standard model (SM) particles, a SM-singlet vector mediator  $X$  is required from renormalizability and SM gauge quantum numbers. To satisfy the latest bounds of direct searches and to reproduce the DM relic density at the same time, resonant enhancement in DM annihilation diagram is needed. Thus, the masses of DM and the mediator are related.

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