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Direct Detection of Electroweak-Interacting Dark Matter in the Universe

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Assuming that the lightest neutral component in an SU(2)L gauge multiplet is the main ingredient of dark matter in the universe, we calculate the elastic scattering cross section of the dark matter with nucleon, which is an important quantity for the direct detection experiments. When the dark matter is a real scalar or a Majorana fermion which has only electroweak gauge interactions, the scattering with quarks and gluon are induced through one- and two-loop quantum processes, respectively, and both of them give rise to comparable contributions to the elastic scattering cross section. We evaluate all of the contributions at the leading order and find that there is an accidental cancellation among them. As a result, the spin-independent cross section is found to be O(10ˆ−(46−48)) cmˆ2, which is far below the current experimental bounds.

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