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# Light Fermionic Dark Matter Absorption on Electron Targets

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The direct detection of light dark matter (DM) is a big challenge. The kinetic energy of halo light DM is so small that the energy transfer through elastic scattering with nuclei can hardly exceed the detection threshold. In addition to using electron target, one possible way of overcoming this difficulty is fermionic DM absorption. Being converted to a massless neutrino, the light DM releases all its mass into energy for the final-state neutrino and electron. Even O(10)keV DM can already leave large enough electron recoil energy, thanks to the efficient mass conversion to energy. It also gives a unique signal with clear peak in the electron recoil spectrum whose shape is largely determined by the atomic effects. Terrestrial direct detection experiments, such as PandaX-II and Xenon1T, can be sensitive to this absorption signal. In addition, the DM overproduction, its invisible and visible decay effects on the cosmological evolution and the astrophysical X(gamma)-ray are thoroughly explored to give up-to-date constraints. Recently, the PandaX group uses the latest result with 0.63 tonne-year exposure from Panda-4T to put a stringent constraint. The result gives the first DM direct detection probe whose sensitivity already exceeds the indirect ones from astrophysical and cosmological observations, especially in the mass range from 25 to 45 (35 to 50) keV for an axial-vector (vector) interaction, respectively. This talk will elaborate the direct and indirect searches for this unique scenario of fermionic DM absorption on electron targets, including the second quantization treatment of the atomic effects.

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