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Recombination in liquid xenon for low-energy recoils[1] LU WANG, DONGMING MEI, Univ of South Dakota, CUBED COLLABORATION — Detector response to low-energy recoils in sub-keV region is critical to detection of low-mass dark matter particles-WIMPS (Weakly interacting massive particles). The role of electron-ion recombination is important to the interpretation of the relation between ionization yield and scintillation yield, which are in general anti-correlated. Recent experimental results show that ionization yield increases down to keV range. This phenomenon contradicts general understanding for low energy recoils in the keV range in which direct excitation dominates. The explanation is that recombination becomes much less efficient when the track length is smaller than the thermalization distance of electrons. However, recombination rate is also proportional to ionization density, which is very high for keV recoils. To understand how recombination rate behaves for keV recoils, we calculated both initial recombination rate and volume recombination rate for keV recoils in liquid xenon. In this paper, we show the results of the calculated recombination rate as a function of recoil energy for both electronic recoils and nuclear recoils.

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