Dark Matter Detector on the Basis of Superfluid ^{3}He.

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Superfluid ^{3}He-B at ultra-low temperatures is an appealing target material for bolometric particle detection, and particularly for the search of non-baryonic Dark Matter. The main arguments in favor of ^{3}He are its non-zero nuclear magnetic moment (allowing therefore to explore the Spin-Dependent interaction channel) combined to the extremely high sensitivity of superfluid ^{3}He bolometers and the possibility of efficient neutron background discrimination[1]. We have studied intensively the recoil energy after an event with different types of radiation. We have found the different ways of recoil energy thermalization. The main part is going to quasiparticles creation. Another part is going for the creation of vortices. And the last one is going for dimers formation. We have found experimentally that the 1/4 th part of this energy radiates photons, while the 3/4 th part returns back to quasiparticles after a dimers breakdown near the walls of the cell. We are able to use this mechanism for discrimination between nuclear and electrons recoil. The time of vortex decay depends strongly on the history of the sample. It means that in superfluid ^{3}He exist some stable defects which can be removed by annealing [2] [3]

[1]J. Elbs, et.al. J. of Low Temp. Phys. 151, 860, (2008)
[2]K.Belotsky, et.al. http://arXiv.org/abs/astro-ph/0606350 (2006)
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