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Possibility of detecting low-energy nuclear recoils by nano-explosive detection in NaI(Tl)

Detection of low-energy solar and reactor neutrinos (neutrino fog) would be a milestone for direct dark matter searches. Backgrounds in excess of expectations prevent the detection of low-energy neutrino elastic scattering on nuclei in all types of detectors, and evidence is mounting that energy /charge trapping and delayed releases contribute to these phenomena.
Since we have demonstrated that UV light pumps energy into NaI(Tl), causing long-lasting delayed luminescence which can be quenched by red light exposure, the question arises if the production of long-leaving energy-bearing states /electron traps can be used to realize a 'nano-explosive'detection scheme. Here, neutrino coherent scattering or low-mass dark matter particle interactions that have too little energy to directly produce luminescence could instead release greater amounts of stored energy. With a controlled energy pumping scheme, this mechanism might provide a highly sensitive probe for low-energy nuclear recoils. We also describe how such dynamics might help to explain the DAMA-LIBRA observations.
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