

NEWS

Nuclear Emulsions for Wimp Search

The most convincing candidate as main constituent of the Dark Matter in the Universe consists of weakly interacting massive particles (WIMP). In the experiments carried out so far, recoiled nuclei are searched for as a signal over a background produced by Compton electrons and neutron scatterings. Signal found by some experiments have not been confirmed by other techniques. None of these experiments is able to detect the track, less than one micron long in a solid material, of the recoiled nucleus and therefore none is able to directly detect the incoming direction of WIMPs. This proposal explores a very innovative method to observe the incoming apparent direction of WIMPs, which would provide a new and unambiguous signature.

We propose a new experiment to observe the track of the scattered nucleus based on new developments in the nuclear emulsion technique: films with nanometric silver grains, innovative detection techniques with optical microscopes and very fast automated scanning systems. Nuclear emulsions would act both as the WIMP target and as the tracking detector able to reconstruct the direction of the recoiled nucleus. Experiments using gaseous targets may see the track of the recoiled nucleus, but they are limited in mass by the extremely low density of gases and therefore cannot compete in sensitivity with our approach. The proposed experiment is therefore unique in performing the first directional search for dark matter with high sensitivity.