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Directional dark matter search with nuclear emulsion technology

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Direct Dark Matter searches are nowadays one of the most fervid research topics with many experimental efforts devoted to the search for nuclear recoils induced by the scattering of Weakly Interactive Massive Particles (WIMPs). Detectors able to reconstruct the direction of the nucleus recoiling against the scattering WIMP are opening a new frontier to possibly extend Dark Matter searches beyond the neutrino background. Exploiting directionality would also prove the galactic origin of Dark Matter with an unambiguous signal-to-background separation. Indeed, unlike the background sources, the angular distribution of recoiled nuclei is expected to be centered around the direction of the Cygnus constellation. Current directional experiments are based on gas TPC whose sensitivity is limited by the small achievable detector mass. In this talk we present the discovery potential of a directional experiment based on the use of a solid target made of newly developed nuclear emulsions and of optical read-out systems reaching unprecedented nanometric resolution.

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