

Dark matter search with liquid xenon two-phase detectors.

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Two-phase emission detectors using liquid xenon working medium are extremely sensitive to ionization (down to single electrons), can be very massive (in tons scale) and provide active shielding from natural radioactivity in wall-less configuration of the readout system. That is why they found their unique application in the most sensitive experiments searching for cold dark matter in the form of weakly ionizing massive particles (WIMPs) such as LUX, XENON100, and PandaX-II. The last results of those experiments are reviewed in this paper. The current best limits for the interaction cross sections of supersymmetric WIMPs having a mass of 100 GeV/c² with nucleons were measured with emission detector LUX containing 360 kg of liquid xenon. Emission detectors of the next generation G2, such as LZ with an active detector mass of 7 tons, will either unambiguously detect WIMPs or rule out all current theoretical predictions for WIMP existence. Detectors of the G3 generation of up to 20 ton mass will be used for multiple purposes including detection of double beta neutrinoless decay and low-energy neutrinos.

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Primary author(s) : BOLOZDYNIA, Alexander (NRNU MEPhI)

Presenter(s) : BOLOZDYNIA, Alexander (NRNU MEPhI)

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