

First experimental results in High Pressure Xe + TMA mixtures towards supra-intrinsic energy resolution and sensing of Dark Matter directionality

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Trimethylamine (TMA) may improve the energy resolution of gaseous xenon based detectors. This molecule may also be the key for sensing directionality of nuclear recoils induced by Weakly Interacting Massive Particles (WIMPs) without the need of track imaging in monolithic massive (ton-scale) detectors. Nuclear recoil directionality may be the venue for a definite discovery of the WIMP nature of Dark Matter.

An ionization chamber has been constructed and is currently being operated to explore the properties of high pressure gaseous Xe+TMA mixtures for particle detection in rare-event experiments. The ionization, scintillation and electroluminescence signals are measured as function of pressure, electric field and additive concentration. We present and discuss preliminary results for pure xenon at pressures up to 8 bar.

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