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Background optimization for a new spherical gas detector for very light WIMP detection

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The Spherical gaseous detector (or Spherical Proportional Counter, SPC) is a novel type of particle detector, with a broad range of applications. Its main features include a very low capacitance, then a potential low energy threshold independent of the volume, a good energy resolution, robustness and a single detection readout channel. Applications range from radon emanation gas monitoring, neutron flux and gamma counting and spectroscopy to dark matter searches, in particular low mass WIMP's and coherent neutrino scattering measurement. Laboratories interested in these various applications share expertise within the NEWS (New Experiments With Sphere) network. SEDINE, a low background spherical detector installed at underground laboratory (LSM) is currently being operated and aims at measuring events at very low energy threshold, around 100 eV. We will present the energy calibration with ^{37}Ar , the obtained energy resolution with different gas mixtures at different pressures, background reduction using pulse shape analysis, measurement of detector background and its interpretation, and show anticipated sensitivities for dark matter search with SEDINE.

Summary

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