

# Neutron spectroscopy with a nitrogen-filled large-volume spherical proportional counter at high pressure

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In direct searches for dark matter, a dedicated, precise, and in-situ measurement of the neutron flux in underground laboratories is of paramount importance, as neutron induced backgrounds can mimic the standard dark matter signal.

We investigate the development of novel neutron spectroscopy technique, using spherical proportional counters (SPC) operated with N<sub>2</sub>-based gas mixtures. This exploits the  $^{14}\text{N}(n,\alpha)^{11}\text{B}$  and  $^{14}\text{N}(n,p)^{14}\text{C}$  reactions for the detection of fast and thermal neutrons, respectively. Recent advancements in SPC instrumentation, including the multi-anode resistive sensor, improve the field homogeneity in the volume of the detector, provide efficient charge collection with high gain, and allow increased target masses through operation at high pressures. We present measurements of fast and thermal neutrons from an Am-Be source with SPCs installed at the University of Birmingham and the Boulby underground laboratory, operated in pressures up to 2 bar.

## TIPP2020 abstract resubmission?

No, this is an entirely new submission.

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