



Reducing Background Noise in High-Pressure Neutron Scattering with a Compact Radial Collimator

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Neutron scattering in high-pressure environments offers unique opportunities to measure the physical properties of matter but faces challenges due to low signal intensity and high background noise. In this study, Monte Carlo simulations were employed to identify background sources in low-temperature and high-pressure sample environments at the SINQ instrument CAMEA. Simulation results suggest that the piston pressure cell (PC) contributes significantly to the background noise in neutron scattering experiments. To counter this background, a compact radial neutron collimator was developed to reduce background in the sample environment, and its performance was evaluated experimentally. Measurements show that the collimator reduces the background generated by the PC effectively, especially for low q . Noise from the collimator was observed, and strategies to address this issue were discussed.

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