

Abstract Submitted  
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**Improving Signal Detection using Allan and Theo Variances**<sup>1</sup> ANDREW HARDY, MARK BROERING, WOLFGANG KORSCH, Univ of Kentucky — Precision measurements often deal with small signals buried within electronic noise. Extracting these signals can be enhanced through digital signal processing. Improving these techniques provide signal to noise ratios. Studies presently performed at the University of Kentucky are utilizing the electro-optic Kerr effect to understand cell charging effects within ultra-cold neutron storage cells. This work is relevant for the neutron electric dipole moment (nEDM) experiment at Oak Ridge National Laboratory. These investigations, and future investigations in general, will benefit from the illustrated improved analysis techniques. This project will showcase various methods for determining the optimum duration that data should be gathered for. Typically, extending the measuring time of an experimental run reduces the averaged noise. However, experiments also encounter drift due to fluctuations which mitigate the benefits of extended data gathering. Through comparing FFT averaging techniques, along with Allan and Theo variance measurements, quantifiable differences in signal detection will be presented.

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