Canadian Association of Physicists
Association canadienne des physiciens et physiciennes

Contribution ID: **2187** Type: **Oral Competition (Graduate Student) / Compétition orale (Étudiant(e) du 2e ou 3e cycle)**

A Novel Approach to Account for the Fano Factor (G)*

Tuesday 12 June 2018 14:00 (15 minutes)

As first discussed by U. Fano in the 1940's, the statistical fluctuation of the number of e-/ion pairs produced in an ionizing interaction is known to be sub-Poissonian, the dispersion being reduced by the so-called "Fano Factor". Despite this knowledge, the Poisson distribution is commonly used to model the quantization of ionizing processes while the effect of the reduced dispersion is folded in with other processes affecting energy resolution. While this approximate treatment is valid down to relatively low energies, experiments now have energy thresholds low enough such that more accurate modeling on the order of a few pairs has become necessary.

We propose a new approach to this problem using a novel discrete probability distribution not well-known in the field of particle physics. The validity of this treatment is supported with calibration data obtained with a spherical proportional counter from the NEWS-G dark matter search experiment. As an application of this, the potential impact of the Fano Factor on sensitivity to low mass WIMPs is discussed as well.

Authors: Mr DURNFORD, Daniel (Queen's University); NEWS-G COLLABORATION

Presenter: Mr DURNFORD, Daniel (Queen's University)

Session Classification: T3-3 Particle Physics IV (PPD) | Physique des particules IV (PPD)

Track Classification: Particle Physics / Physique des particules (PPD)