Contribution ID: **39** Type: **Talk**

A novel approach to assess the impact of the Fano factor on the sensitivity of low-mass dark matter experiments

Thursday 1 August 2019 16:00 (30 minutes)

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". Due to a lack of appropriate modelling tools, this phenomenon is often folded into the overall energy response of ionization detectors. While this may be adequate down to relatively low-energies, this treatment is not sufficient for a new generation of dark matter experiments with single-quanta sensitivity, such as the NEWS-G light dark matter experiment. To address this problem, we propose the use of the Conway-Maxwell-Poisson distribution for the purpose of modelling primary ionization (D. Durnford et al., Phys. Rev. D 98, 103013 [2018]). This choice of distribution is supported by calibration with sub-keV Ar-37 x-rays and a UV laser in a NEWS-G Spherical Proportional Counter (Q. Arnaud et al., Phys. Rev. D. 99, 102003 [2019]). The potential impact of the Fano Factor on sensitivity to low mass dark matter is discussed as well.

Primary author: Mr DURNFORD, Daniel (University of Alberta)

Presenter: Mr DURNFORD, Daniel (University of Alberta)

Session Classification: General