

# Plasmons and Excesses in Low-Threshold Dark Matter Experiments

*Thursday, 20 February 2020 19:00 (30 minutes)*

Spectacular advances in dark matter detection experiments, using a variety of detector materials, have pushed energy thresholds below 60 eV and charge detection to single-charge resolution. Eleven such low-threshold experiments have observed an unexplained excess of events at low energies. Surprisingly, the excess rates of  $\sim 10$  Hz/kg in semiconductor detectors are the same to within a factor of a few, independent of exposure, overburden, shielding, or detector location, while the rates at noble liquid detectors are much smaller but are also consistent to within an order of magnitude. Taken together, I will argue that these disparate results can be explained if some external source is exciting a plasmon resonance in the semiconductor detectors, which is absent in disordered materials. If the external source happens to be dark matter, the couplings and masses required to explain the observed rate are consistent with standard thermal mechanisms for obtaining the correct relic abundance. I will mention numerous testable predictions for this scenario, many of which imply interesting new detector physics whether or not dark matter is the source of the observed events.

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**Session Classification:** Evening session