Contribution ID: **1065** Type: **Poster (Non-Student) / affiche (non-étudiant)**

Detection of Metastable Particles Using Solid N2 at 10K

Tuesday 14 June 2016 19:04 (2 minutes)

Metastable particles produced in the interaction of electrons of carefully controlled energy with thermal gaseous target beams in a crossed beam set-up have been studied in the energy range from threshold to 300 eV. The e-beam is pulsed and the metastables produced drift to a solid nitrogen detector held at 10 K. Here they transfer their energy to states which radiate. The resultant photons are detected using a photomultiplier-filter combination. Time-of-flight techniques are used to separate these photons from prompt photons produced in the initial electron collision. With N2 as both target and detection matrix, the emission is strongest in the green but still significant in the red spectral region. Excitation functions will be presented together with threshold measurements. These help to identify the metastable states being observed and the excitation mechanisms which are responsible.
The authors thank NSERC and CFI, (Canada), for financial support.

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Session Classification: DAMOPC Poster Session with beer / Session d'affiches avec bière DPAMPC

Track Classification: Division of Atomic, Molecular and Optical Physics, Canada / Division de la physique atomique, moléculaire et photonique, Canada (DAMOPC-DPAMPC)