Abstract Submitted
for the DNP12 Meeting of
The American Physical Society

Searching for nuclear excitation by electronic transition in U-235

P. CHODASH, E.B. NORMAN, E. SWANBERG, UC Berkeley, J.T. BURKE, R.J. CASPERSON, S. WILKS, Lawrence Livermore National Laboratory — Nuclear excitation by electronic transition (NEET) is a rare nuclear excitation that is predicted to occur in numerous isotopes, including U-235. NEET can occur when a nuclear transition closely matches the energy and multipolarity of an electronic transition. U-235 has a 1/2+ isomeric state that decays to the 7/2- ground state with a transition energy of 77 eV and a half life of 26 minutes. Theory predicts that electronic transitions exist within a partially ionized uranium plasma that would allow NEET to occur. The NEET process would excite U-235 into its isomeric state and then it will subsequently decay to the ground state via internal conversion. It is currently not known if this excitation occurs in U-235 and at what rate. In order to generate the uranium plasma with the correct conditions, a high power Q-switched Nd:YAG laser will irradiate a sample of highly enriched uranium. The resulting plasma will be collected on a catcher foil and counted using a microchannel plate detector. Current progress on the experiment will be presented.

1This work was performed under the auspices of the U.S. Department of Energy by Lawrence Livermore National Laboratory under contract DE-AC52-07NA27344. This work was further supported by the U.S. DHS, UC Berkeley, and the NNIS Fellowship.

Date submitted: 02 Jul 2012

Perry Chodash
UC Berkeley

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