Old Dominion University
Department of Physics

Colloquium

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" Uncertainties in Photonuclear Reaction Cross Sections and Why it Matters"

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Photonuclear reactions below the pion production threshold, with photons in either the entrance channel or the exit channel (or both), have been intensively studied since the late 1950s. The competitive advantage of real photons in exploring E1 excitation strength and decay channels and, to a lesser extent, E2 and M1 excitations, led to the systematic measurement and establishment of photonuclear sum rules for these low multipole excitations. Quantities such as integrated photo-absorption cross sections up to pion photo-production threshold, and the distribution of E1, E2 and M1 strength, are well established for many nuclei. However, there are large uncertainties in the cross sections and systematics of individual reaction channels, and the models that predict them, because of a dearth of measurements. Moreover, many stable isotope photo-nuclear cross sections are unmeasured or only measured over a small energy range. Yet, and perhaps most importantly, there are many proposed applications of photo-nuclear physics that require or would greatly benefit from well-measured cross sections of individual reaction channels. These range from radiation shielding and dosimetry, to radio-isotope production for medicine, to nuclear non-proliferation, homeland security and nuclear forensics, to photo-neutron sources for accelerator-driven subcritical systems (ADSS) The need for these photo-nuclear data can best be filled by a bright, CW photon source capable of high fluxes in the energy range from approximately 10 to 100 MeV. This presentation will focus on the photo-nuclear data gaps and how to fill them, the nuclear physics that such data would clarify, and the many nuclear applications that would benefit from these data.

Presentation: OCNPS 200 @ 3:00 pm
Refreshments: OCNPS Atrium @ 2:30 pm

All interested persons are cordially invited to attend.