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Deconvolution of Photon Strenghth and Level Density

Friday 25 May 2018 10:00 (20 minutes)

Photonuclear reaction cross sections are well described by the Brink-Axel hypothesis and are widely used to describe the E1 "photon strength" above the neutron separation energy. The Oslo Method has been developed to unfold total "photon strength" below the neutron separation energy. Although both methods are commonly assumed to derive "photon strengths", they actually derive the product of photon strength and level density. Neither quantity is well understood as a function of spin/parity, energy, and multipolarity. In this talk I will demonstrate how to unfold the level density and photon strength from both photonuclear and Oslo reaction data. This results in a continuous, exponentially declining photon strength which when multiplied by the exponentially increasing level density generates the giant dipole resonance. I will show that similarly unfolding the Oslo reaction data provides a better normalization of the "photon strength" data resulting in a nearly constant photon strength for all molybdenum isotopes that is consistent with the comparable photonuclear data. This analysis will also be used to explain thermal neutron capture photon strength where the initial/final state spin dependency must be accounted for.

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