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Systematics of photon strength functions

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The photon strength of high energy E1 transitions is well described by Brink-Axel theory based on the contribution of the Giant Dipole Resonance. No adequate theory is available for M1 and E2 transitions which do not generally compete strongly with high energy E1 transitions. Measurements with the ^{57}Fe(^{3}He,^{3}He') reaction at the Oslo cyclotron have revealed that the photon strength below 2 MeV greatly exceeds BA predictions. Similar results have been found for numerous other nuclides. In this paper I will discuss my analysis of the ^{56}Fe(n,γ)^{57}Fe reaction which we investigated with both cold neutrons from the Budapest Reactor and thermal neutrons from the Rez Reactor (Prague). A >99% complete ^{57}Fe capture γ-ray decay scheme containing 449 γ-rays deexciting 100 levels has been constructed on the basis of γ-ray singles and $\gamma\gamma$-coincidence data. The photon strengths for 90 primary γ-rays with energies ranging from 92-7646 keV were calculated and compared with the predictions of Brink-Axel (BA) theory. Excellent agreement has been attained for the high energy transitions while the strength below 2 MeV exceeds BA predictions confirming the earlier Oslo (^{3}He,^{3}He'γ) results. Photon strengths for another 95 secondary M1, E1, and E2 γ-rays were also determined to also exceed BA predictions for transitions below 4 MeV. The dependence of photon strength on level energy and the statistical distribution of photon strengths will also be discussed in this talk.