

Level densities in the actinide region and indirect n, γ cross section measurements using the surrogate method

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The first results of a program of measurements for level densities in the actinide region are presented. An experiment at the Oslo cyclotron involving the Cactus/Siri detectors and $^{232}\text{Th}(d,x)$ and $^{232}\text{Th}(^3\text{He},x)$ reactions was carried out to help answer the key question of which level density model is the most appropriate for actinide nuclei, since it will have a large impact on cross section calculations important for reactor physics simulations.

In addition, simultaneous measurements of compound nuclear gamma decay probabilities have been carried out for the key thorium cycle nuclei ^{233}Th , ^{231}Th and ^{232}Pa up to around 1MeV above the neutron binding energy and have enabled extraction of indirect neutron induced capture cross sections for the ^{232}Th , ^{231}Pa and ^{230}Th nuclei using the surrogate reaction method. Since the neutron capture cross section for ^{232}Th is already well known from direct measurements a comparison provides a stringent test of the applicability of the surrogate technique in the actinide region.