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Level densities, Decay probabilities and Cross sections in the actinide region

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The first results from a new program of experiments to measure nuclear level densities in the actinide region will be presented. This series of measurements has three important goals: 1) To provide systematic level density information for improving cross section calculations where direct measurements are difficult or impossible. 2) The simultaneous measurements of compound nuclear decay probabilities using the surrogate method. 3) The exploration of fine structure in actinide level densities and strength functions, of particular interest for fundamental physics reasons.

Results will be presented from recent experiments carried out at the Oslo cyclotron using $^{232}\text{Th}(d,x)$ and $^{232}\text{Th}(^3\text{He},x)$ transfer reactions to populate several actinide nuclei. Level densities in $^{231,232,233}\text{Th}$ up to the binding energy can be extracted using the Oslo method. In addition, compound nuclear decay probabilities for ^{230}Ac , ^{232}Pa , ^{231}Th and ^{233}Th below fission thresholds have been measured using the surrogate method. For the case of $^{233}\text{Th}^*$, the results can be compared with the $^{232}\text{Th}(n,\gamma)$ nTOF direct cross section measurements providing a good test of the validity of the surrogate method.

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