HW 4 Extra Credit

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I attended a talk by Ruchi Mahajan in which she was discussing her thesis on “the study of the dynamics of fusion-fission reactions using neutron multiplicity as a probe”. For her thesis she focused on the decay of compound nuclei with E <= 10 MeV/A, which could either undergo evaporation or fission. The three stages in which neutron emission can occur is the formation phase, pre-saddle stage, and the saddle to scission stage, the final during which a number of neutrons can be emitted. For studying reaction dynamics, pre-scission neutrons are the most commonly used probe. The motivation for her thesis was to determine the role of shell effects and dissipation, disentangle fusion-fission and quasi-fission process, and investigate the mass dependence of neutron multiplicity. For her research she used a pulse-shaped discrimination technique since neutron detectors were sensitive to both neurons and gamma waves, which needed to be differentiated. She did mass distribution measurements through folding angle calculations and theta-phi correlation and found neutron multiplicity corresponding to different mass cuts for 48Ti + 154Sm at E* = 72 MeV. Since all decay channels were equally probable in her statistical mode, she used Bohr-Wheeler fission width. She also introduced delay time to find the number of neutrons emitted until nucleus undergoes fission.

Note: Sorry if the summary is quite scattered, parts of the presentation went over my head. It was interesting for me to listen to since some of it was tangential to some research I’m currently undertaking, but other aspects of the presentation were unfamiliar to me. This caused my summary to be a bit of a hodgepodge.