

Fuzzy barrier distributions*

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Heavy-ion collisions often produce a fusion barrier distribution with structures displaying a fingerprint of couplings to highly collective excitations [1]. Basically the same distribution can be obtained from large-angle quasi-elastic scattering, though here the role of the many weak direct-reaction channels is unclear. For $^{20}\text{Ne} + ^{90}\text{Zr}$ we have observed the barrier structures expected for the highly deformed neon projectile, but for $^{20}\text{Ne} + ^{92}\text{Zr}$ we find completely smooth distribution (see Fig.1). We find that transfer channels in these systems are of similar strength but single particle excitations are significantly stronger in the latter case. They apparently reduce the “resolving power” of the quasi-elastic channel, what leads to smeared out, or “fuzzy” barrier distribution. This is the first case when such a phenomenon has been observed.

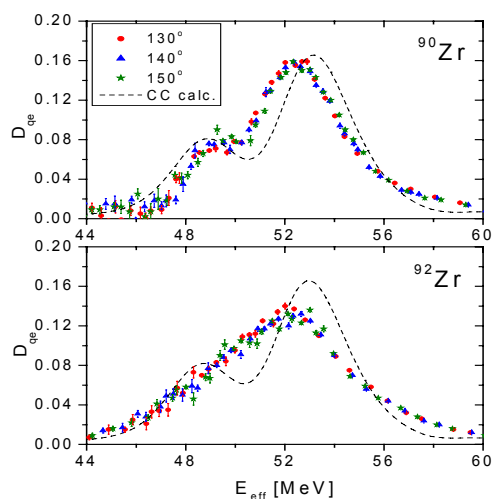


Fig. 1. Barrier distributions for the $^{20}\text{Ne} + ^{90,92}\text{Zr}$ systems. Different symbols refer to different laboratory detector angles. The dashed lines shows the Coupled Channels predictions (folded with experimental resolution).

[1] M. Dasgupta et al., *Annu. Rev. Nucl. Part. Sci.* **48** (1998) 401

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