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Strong absorption model for break-up threshold anomaly

The fusion of weakly bound nuclei, both stable and radioactive, has been the subject of renewed interest both in theory and experiment. In the recent years with the advent of acceleration techniques, it has become possible to produce variable in energy, relatively intense beams of weakly bound nuclei in a wide range of N and Z. The use of secondary beams of radioactive nuclei considerably widens the possibilities to investigate the properties of atomic nuclei and nuclear reactions. The difference between tightly bound and weakly bound projectiles in energy-dependent behavior of the optical potential has drawn much attention. In the past, several important characteristics have been utilized to study the difference between tightly bound and weakly bound projectiles. In the present work, a strong absorption model (SAM) has been proposed, to explain the experimental results for different systems with stable and weakly bound nuclei. This model is based on the idea that the nuclei have relatively sharp edges and that any contact between two colliding nuclei inevitably leads to the removal of flux from the elastic channel through the occurrence of inelastic scattering and other reaction channels. The strong absorbing radius that comes from this SAM is an important characteristic to explain reactions with various projectile systems. Bigger the value of strong absorbing radius, smaller will be the Coulomb force range that relate to the Coulomb barrier. This can be used to explain the phenomena of break-up threshold anomaly (BTA).

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