

Theory of the Trojan Horse Method

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The Trojan Horse method is an indirect approach to determine the energy dependence of S factors of astrophysically relevant two-body reactions, for a recent work on this subject and further references see [1]. This is accomplished by studying a closely related three-body reaction under quasifree scattering conditions. The basic theory of the Trojan-Horse method is developed starting from a post-form distorted wave Born approximation of the T-matrixelement. In the surface approximation the cross-section of the three-body reaction can be related to the S-matrix elements of the two-body reaction. The essential feature of the Trojan-Horse method is the effective suppression of the Coulomb barrier at low energies for the astrophysical reaction leading to finite cross-sections at the threshold of the two-body reaction. We discuss illustrative examples of the Trojan-Horse method including recent experiments by the Catania group. The absence of electron screening effects is an important issue.

[1] S.Tygel and G.Baur *Ann. of Phys.* 305(2003)228