Hindrance of fusion cross sections induced by ^{6}He.

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In this work, we show that the São Paulo Potential (SPP)[1] can be used as the bare potential for systems involving weakly bound nuclei. It is a trustful alternative to the difficult procedure of obtaining experimental barrier distributions that requires precise and high statistics measurements. These measurements are not yet available for experiments with radioactive beams and present great experimental difficulties even when high intensity stable beams are used. In a first step, analyzing the available data for stable weakly bound systems, we demonstrate that, even when experimental barrier distribution is not available to constrain the parameters of the potential, the SPP model can be assumed in the theoretical calculations and it provides a good description of the reaction mechanism and an accurate estimate for the fusion suppression factor at energies above the barrier[2].

In order to extend our procedure to exotic nuclei, the densities of those nuclei should be included in the folding potential. As the ground-state density of ^{6}He is already known, we use this quantity in the folding SPP and analyze fusion induced by the halo radioactive projectile ^{6}He[3]. For two of the three systems analyzed, we have found a similar behavior as the one for stable weakly bound ^{6}Li, ^{7}Li and ^{9}Be projectiles: at energies above the barrier there is a fusion cross section suppression of the order of 15 – 20 %, probably due to the effect of the breakup that produces a strong coupling between the elastic channel and the continuum states. The third system, ^{6}He + ^{64}Zn, shows much larger fusion suppression at energies above the barrier.

References:

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