JEANNIE RANGEL BORGE

THEORY OF COMPLETE AND INCOMPLETE FUSION FOR WEAKLY BOUND SYSTEMS

Collisions of weakly bound projectiles have attracted great interest over the last few decades.The low breakup threshold of the projectile plays an important role in the reaction dynamics, affecting strongly the fusion channel. Besides the ordinary fusion process, where the whole projectile fuses with the target (CF), there is the so-called incomplete fusion (ICF) which one fragment is captured while the other survives the collision. Most experiments can only determine the total fusion cross section (TF), which is the sum of the cross sections for the CF and ICF processes. To make predictions for the CF and ICF cross sections is also a great challenge to theorists, and several attempts have been made. Many of them are based on classical or semiclassical methods, which cannot properly handle important quantum mechanical effects. This problem is avoided in some quantum mechanical models based on the continuum discretized coupled channel (CDCC) method. However, some of them can only determine the TF cross section, some can give individual CF and ICF cross sections but are not valid when the projectile breaks up into fragments of comparable masses. There is also a method that provides the CF cross section but cannot determine ICF. In this seminar I will present a new quantum mechanical method to evaluate individual CF and ICF cross sections. This method can be used to any weakly bound projectile and, in addition, it distinguishes the direct and sequential contributions to the CF cross section. A few applications will be presented

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