Applications

$^{11}Be(Beryllium) + ^{209}Bi(Bismuth)$

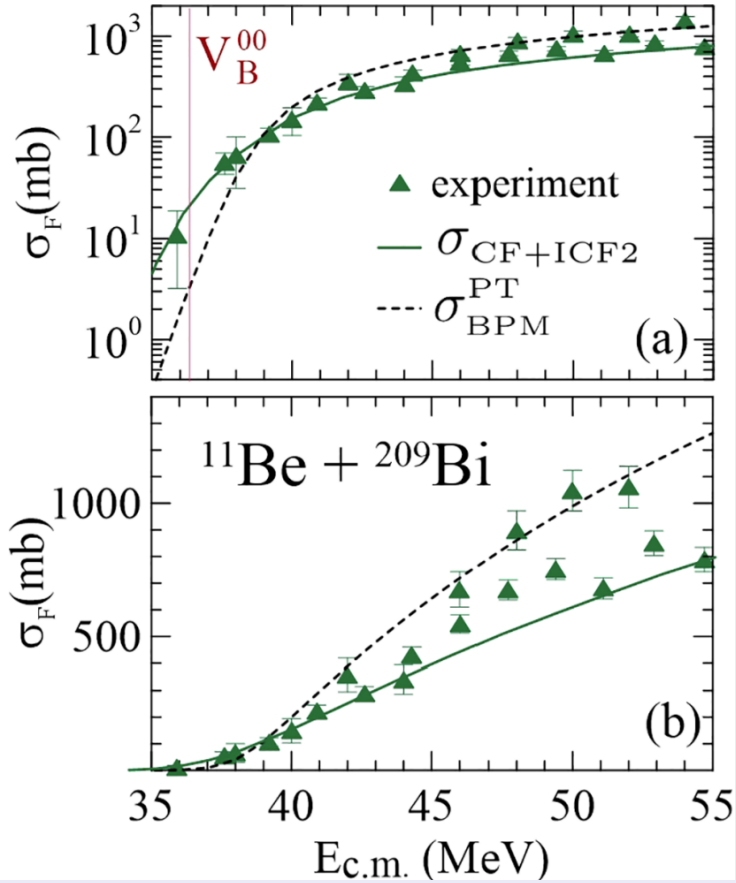

Figure 1: Experimental fusion cross section in comparison with the prediction of the model and of the BPM

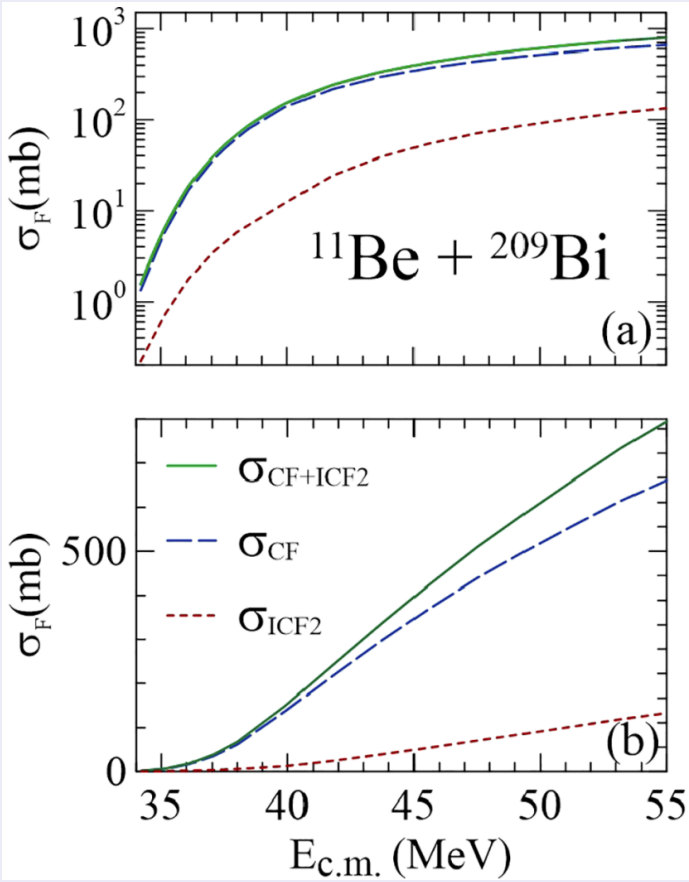

Figure 2: $\sigma_{CF+ICF2}$ and its 2 components

Applications

Explanations

- V_B^{00}: The size of the barrier
- Why the cross section of $\sigma_{CF+ICF2}$? The experiment determines the fusion cross section by the evaporation residues, whereas CF and ICF2(capture of $^{10}Be(Beryllium)$) correspond to the same evaporation residues. $\rightarrow$ The experiment cannot distinguish the CF and ICF2.
- Actually the reason: the experimental view and the theoretical view adopt different definitions of CF.
- The authors give the components of CF & ICF2(capture of $^{10}Be(Beryllium)$) respectively $\rightarrow$ σ_{CF} takes the main part.

Applications

$^{6}He(Helium) + ^{209}Bi(Bismuth)$

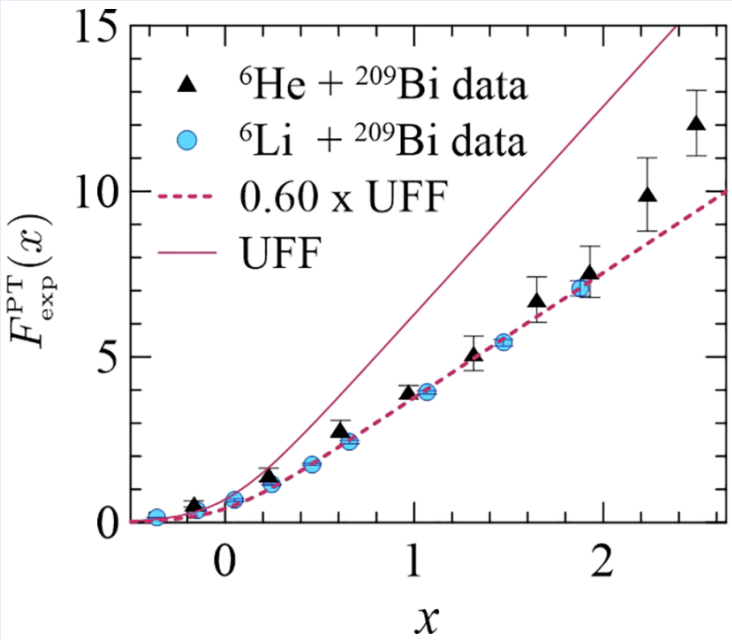

Figure 3: fusion functions of $^{6}He(Helium)$ and $^{6}Li(Lithium)$ on $^{209}Bi(Bismuth)$ target, in comparison with the UFF

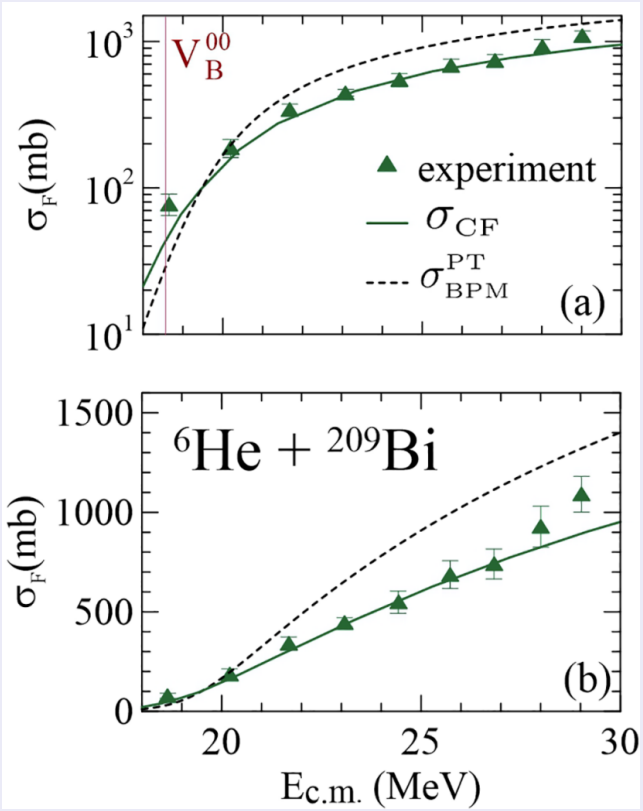

Figure 4: Experimental CF cross section for the $^{6}He(Helium) + ^{209}Bi(Bismuth)$ system, in comparison with authors' model and BPM

Applications

Explanations

- the fusion functions of $^{6}He(Helium)$ and$^{6}Li(Lithium)$ system are very similar because of their similar structure, appreciably lower than the benchmark UFF (by the factor 0.60)
- They treated the halo of 2 neutrons as a single particle, the dineutron $\rightarrow$ the 3-body CDCC method
- From the figure listed, the author's calculations fit the experiment well.

Applications

$^{6}He(Helium) + ^{238}U(Uranium)$

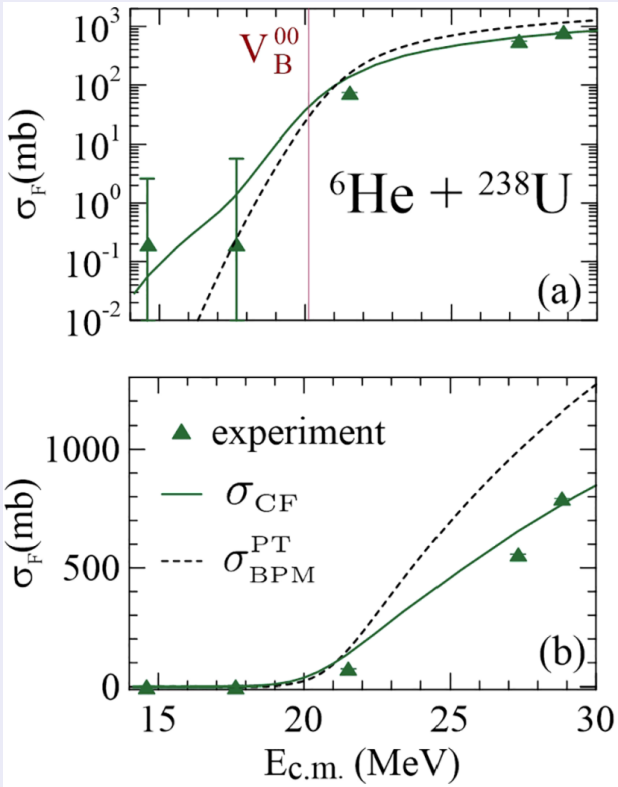

Figure 5: Experimental CF cross section for the $^{6}He(Helium) + ^{238}U(Uranium)$ system, in comparison with their model and BPM

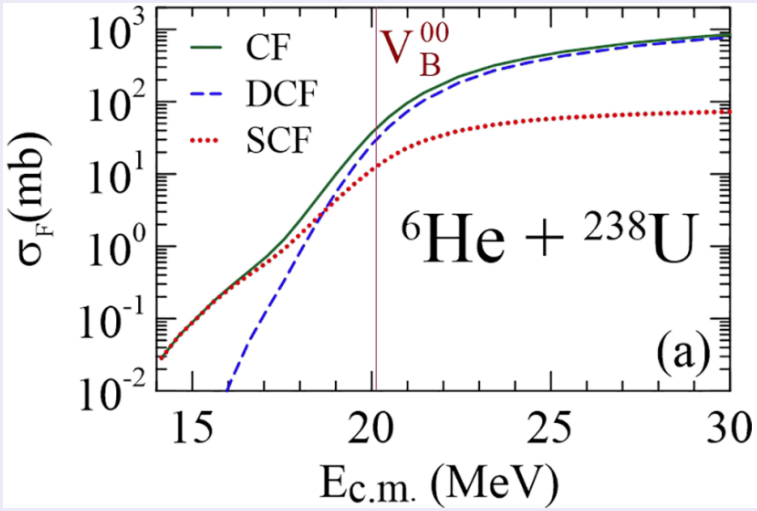

Figure 6: The CF cross section for the $^{6}He(Helium) + ^{238}U(Uranium)$ system, together with the components of DCF & SCF

Applications

Explanations

- Above the Coulomb barrier (above 21 MeV), the data are very well described by their model, but suppressed with respect to σ_{BPM}^{PT}
- Below the Coulomb barrier, the model's agreement with experiment is not meaningful owing to the large error bars of the CF data.
- From Fig.6, one can conclude that the CF cross section would be dominated by σ_{DCF}

Applications

Comparative Study

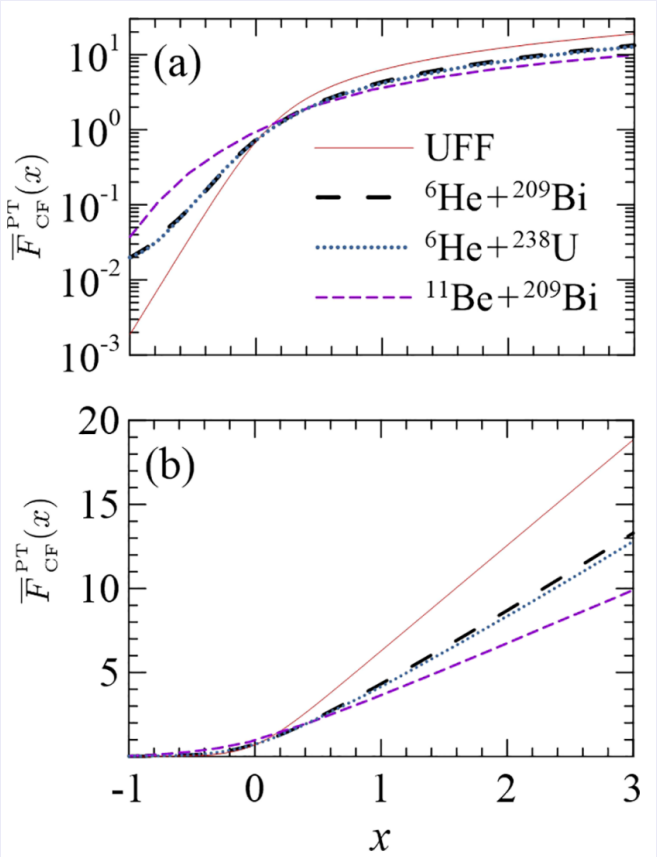

Figure 7: Renormalized fusion functions associated with the CF cross section of the model

Compared with UFF, the same behavior: enhancement below the Coulomb barrier and suppression at above-barrier energies.

Summary

Conclusion

- Their model describes the CF data in collisions of neutron halo nuclei well.
- The overall effect of the low breakup threshold:enhancement at sub-barrier energies and suppression above the Coulomb barrier.
- The enhancement due to the barrier lowering and the suppression arising from breakup couplings depend exclusively on the breakup threshold.
- Essentially, it comes from the competition between bound channel and breakup channel.

Thank You!