Fusion Cross Sections Around the Barrier in ^{11,9}Be + ^{209}Bi

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The ^{9}Be + ^{209}Bi fusion cross sections were measured at the Munich Tandem accelerator in the range $37.5 MeV \leq E_{lab} \leq 45.0 MeV$ in 0.5 to $1.0 MeV$ steps with high accuracy via the observation of the ground state α–decay of the various evaporation residues produced [1]. More accurate ^{11}Be + ^{209}Bi fusion cross sections were deduced by a more detailed analysis, in 1.7 MeV energy steps of the previous [2] experimental data from the RIKEN Ring Cyclotron. The experimental results are compared in the figure with two theoretical approaches based on CCFUS and a similar one (theory 2) which takes into account more accurately the experimental mass distributions in particular of ^{11}Be due to its halo structure.

In the region below the Coulomb barrier the fusion cross sections seem to be very similar for ^{9}Be and ^{11}Be.

This, opposite to what is expected, is in contradiction to the two theoretical calculations which take into account only the large difference of the nuclear radii of the two isotopes, due to the well established halo structure of ^{11}Be.

The behaviour above the barrier is in agreement with what is expected from the Be radii differences i.e. a larger cross section for the ^{11}Be induced fusion compared to the ^{9}Be one.

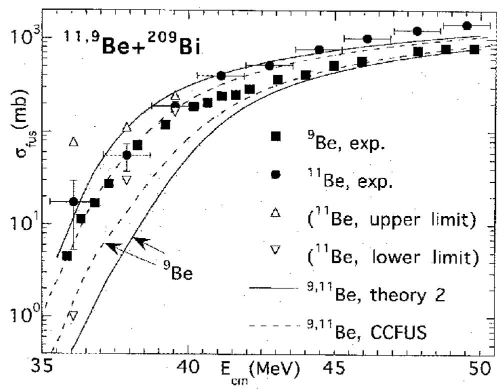

Fig. 1: Measured fusion cross sections for ^{11,9}Be + ^{209}Bi compared to theory 2 and CCFUS calculations.

References

[1] C. Signorini *et al.*, Jahresbericht 1996, p. 12
[2] A. Yoshida *et al.*, Phys. Lett. **B389** (1996) 457