

# Coupled-Channels Analyses on $^{40}\text{Ar} + ^{176,178,180}\text{Hf}$ Heavy-Ion Fusion Reactions

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Heavy-ion collisions are typically characterized by the presence of many open reaction channels. In the energies around the Coulomb barrier, the main processes are elastic scattering, inelastic excitations of low-lying modes and fusion operations of one or two nuclei. The fusion process is generally defined as the effect of one-dimensional barrier penetration model, taking scattering potential as the sum of Coulomb and proximity potential. We have performed heavy-ion fusion reactions with coupled-channels (CC) calculations. Coupled-channels formalism is carried out under barrier energy in heavy-ion fusion reactions. In this work fusion cross sections have been calculated and analysed in detail for the three systems  $^{40}\text{Ar} + ^{176,178,180}\text{Hf}$  in the framework of coupled-channels approach, using the codes CCFULL, CCFUS and CCDEF and compared with experimental data. CCFULL and CCDEF explains the fusion reactions of heavy-ions very well, while using the scattering potential as WOODS-SAXON volume potential with Akyuz-Winther parameters. It was observed that AW potential parameters are able to reproduce the experimentally observed fusion cross sections reasonably well for these systems. There is a good agreement between the calculated results and the experimental results.

## References

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