

## Fusion dynamics of $^{12}\text{C}+^{12}\text{C}$ reaction: An astrophysical interest within the relativistic mean-field approach

The  $^{12}\text{C}+^{12}\text{C}$  fusion reaction holds a great significance in the later phases of stellar evolution. To get involved in this evolution, one must understand the corresponding fusion-fission dynamics and reaction characteristics. In the present analysis, we have studied the fusion cross-section along with the S-factor for this reaction using the well-known M3Y and recently developed R3Y nucleon-nucleon (NN) potential along with the relativistic mean-field densities in double folding approach [1]. The density distributions and the microscopic R3Y NN potential are calculated using the NL3\* parameter set. The  $\ell$ -summed Wong formula is employed to investigate the fusion cross-section, with  $\ell_{max}$ -values from the sharp cut-off model. The calculated results are also then compared with experimental data [2, 3]. It is found that the R3Y interaction gives a nice fit to the data. So it would be of interest to study the details of this fusion reaction in a microscopic approach.

### References:

- [1] M. Bhuyan, Raj Kumar, Shilpa Rana, D. Jain, S. K. Patra, B. V. Carlson, Phys. Rev. C **101**, 044603 (2020); and references therein.
- [2] J. R. Patterson, H. Winkler, and C. S. Zaidins, Ast. Jour. **157**, 367 (1969).
- [3] E. F. Aguilera *et al.*, Phys. Rev. C **73**, 064601 (2006).

**Author:** Ms RANA, Shilpa (School of Physics and Materials Science, Thapar Institute of Engineering and Technology, Patiala 147004, India)

**Co-authors:** Dr KUMAR, Raj (School of Physics and Materials Science, Thapar Institute of Engineering and Technology, Patiala 147004, India); Dr BHUYAN, Mrutunjaya (Department of Physics, Faculty of Science, University of Malaya, Kuala Lumpur 50603, Malaysia)

**Presenter:** Ms RANA, Shilpa (School of Physics and Materials Science, Thapar Institute of Engineering and Technology, Patiala 147004, India)

**Session Classification:** X- & CR RAYS, QM, SNOVAE, GRAVITY, DM, COSMOLOGY, PARTICLES, COMPACT STARS, GALAXIES