

PARTICLE TRANSFER WIDTH IN 3D TDHF FOR  $\text{Ca}^{40} + \text{Ca}^{40}$

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ABSTRACT

The average particle transfer for previously reported 3D TDHF calculations of  $\text{Ca}^{40} + \text{Ca}^{40}$  at  $\text{Elab} = 278$  has been calculated in the Gaussian approximation. The results are significantly larger than corresponding 2D calculations in the heavily weighted large impact parameter region and in agreement with experiment.

Three-dimensional TDHF calculations<sup>1</sup> have yielded a variety of predictions which can be subjected to experimental test. One of the many experimentally pertinent quantities that can be extracted from the post-collision TDHF wave function of a heavy ion collision is the average number of particles transferred. While the total number of particles for the entire system is, of course, preserved in TDHF, an individual fragment need not be an eigenfunction of the number operator itself. Hence the fragment may have associated with it a dispersion in its particle number.

Previous comparisons of 2D and 3D TDHF calculations<sup>2</sup> have been made for  $\text{Ca}^{40} + \text{Ca}^{40}$  at  $\text{Elab} = 278$  MeV and have shown significant differences, primarily in that fusion occurs in the latter and also more energy loss at large incident angular momenta. Calculations of the charged particle transfer have previously been made in 2D<sup>3</sup> for  $\text{Ca}^{40} + \text{Ca}^{40}$  at  $\text{Elab} = 278$  MeV and found to be much smaller than experiment.<sup>4</sup> The post collision wave functions from our previous 3D results have been used to calculate mass dispersion as a function of angle for this same system. Assuming iso-spin symmetry the experiment of Colombani et al.<sup>4</sup> can be interpreted to yield mass transfer. For a C.M. scattering angle of  $30^\circ$ , the experimental result, corrected for evaporation, is approximately 3 units of charge, or 6 units of mass for the full width at half maximum.

The 3D calculation yields 5 mass units for the same quantity. Results will be presented for other energies and angles for  $\text{O}^{16}$  and  $\text{Ca}^{40}$ .

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