

## THE CARBON FUSION PROJECT AT NOTRE DAME

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The total fusion cross sections and the decay branching ratios of  $^{12}\text{C}+^{12}\text{C}$  in the energy range of 1 to 3 MeV are important for a number of astrophysical scenarios, such as the explosion of Type Ia supernovae, nucleosynthesis in massive stars and recently discovered superbursts. Since the molecular resonance phenomena discovered in the  $^{12}\text{C}+^{12}\text{C}$  system in 1960, intensive efforts have been devoted to measuring the carbon fusion reaction at sub-barrier energies by detecting the light charged particles or characteristic gamma-rays. In my talk, I will review the current status of the research on this important fusion reaction at sub-barrier energies and report on the experimental progress at Notre Dame. In addition, I will propose a method to derive the total fusion cross sections from the observable cross sections using the statistical model and discuss the cross section ratio between the proton and alpha channels.