

THREE-DIMENSIONAL SIMULATIONS OF TURBULENTLY-DRIVEN
DEFLAGRATION-TO-DETONATION TRANSITION
IN NEAR-CHANDRASEKHAR TYPE IA SUPERNOVAE

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Type Ia supernovae (SNe Ia) are luminous events which serve as standardizable candles. SNe Ia are crucial in measuring cosmic acceleration and enrich the interstellar medium with their nucleosynthetic yields. While all normal SNe Ia must undergo a detonation, we do not have a complete understanding as to how a detonation arises from the flame ignited within the white dwarf. In this work, we have applied for the first time a laboratory-validated first-principles mechanism of a turbulently-driven deflagration-to-detonation transition in 3D full star simulations of near-Chandrasekhar white dwarfs. We will characterize conditions at the onset of the tDDT and discuss the observable signatures as well as the implications for the broader SN Ia progenitor problem.