



Physics Colloquium

Exploding Stars and Their Aftermath



March 5, 2025 (Wednesday)



5:00 p.m.



**MWT4, 1/F, Meng Wah Complex,
Main Campus, HKU**



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Abstract:

Understanding the death of massive stars in core-collapse supernova explosions has long been a challenge, with simulations struggling to reproduce successful explosions and fully capture the diversity of observed events. Recent advances in 3D multi-physics simulations are now finding success and shedding light on how stellar properties and environments influence explosion dynamics, the formation of neutron stars and black holes, and the nucleosynthesis of heavy elements. Meanwhile, observations are uncovering a range of unusual supernovae—some extraordinarily luminous or exhibiting unexpected X-ray and radio emission—suggesting that ongoing engine activity from the central compact remnant may continue to drive energetic processes even after the explosion. I will discuss recent progress in supernova simulations, which model the full phenomenon—from explosion initiation and stellar disruption to the resulting light curves and spectra observed in the aftermath. The bridging of simulations and observations is helping build a more complete picture of the deaths of massive stars and the remains left behind.

Biography:

Daniel Kasen is a professor in the physics and astronomy departments of UC Berkeley, and a faculty scientist at the Lawrence Berkeley National Laboratory. Prof. Kasen received his B.S. from Stanford University and his M.S. and Ph.D. in physics from UC Berkeley. He was a Hubble Prize Fellow at the University of California, Santa Cruz before joining Berkeley. His interests are in theoretical and computational astrophysics, with an emphasis on supernovae, neutron star mergers and other energetic transients, and their connection to the cosmic origin of the elements, the sources of gravitational waves, and the behavior of material under extreme conditions. Prof. Kasen has received a series of prestigious award and recognition throughout his career, including the Fellow of the American Physical Society, the Bruno Rossi Prize, and the Ernest Orlando Lawrence Award.