



Hans-Thomas JANKA

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Hans-Thomas Janka is staff scientist and group leader at the Max Planck Institute for Astrophysics (MPA) in Garching and Adjunct Professor at the Technical University Munich (TUM). His research fields are the theory of supernova explosions and neutron-star formation, neutrino and nuclear astrophysics, and numerical hydrodynamics and neutrino transport. With his group he has pioneered multi-dimensional simulations of neutron-star mergers and core-collapse supernovae, for which he was awarded the Karl Schwarzschild Medal of the German Astronomische Gesellschaft in 2022. He also received the Otto Hahn Medal of the Max Planck Society (1991), the Heinz Billing Prize for Scientific Computing (1993), and the Hanno and Ruth Roelin Prize for Scientific Publishing (2011). Supported by an ERC Advanced Grant (2013-2019), he began to explore the connection between massive stars and their supernova explosions by three-dimensional simulations with a strong emphasis on testing models through astronomical observations. This is still the main focus of his group.

IJColloquium

Vendredi 25 septembre 2026

10h30

Café accueil à 10h

Auditorium Pierre Lehmann-bât. 200

Supernova Explosions of Massive Stars: Connecting Models and Observations in 3D

The lives of massive stars are terminated by a final catastrophic collapse to a neutron star or black hole. Both can be accompanied by a supernova explosion.

These events play a crucial role in the dynamical evolution of galaxies and their enrichment with chemical elements, as cosmic laboratories for particle and nuclear physics, and as sources of electromagnetic radiation, neutrinos, and gravitational waves, including those currently measured from colliding compact objects in binaries. Modern supercomputer simulations in three dimensions support the long-standing paradigm that energy transfer by neutrinos drives the far majority of supernova explosions. These models begin to yield explanations for many observed phenomena, but they also still struggle with unsolved problems.

The talk will introduce the basic theory, describe the forefront of current research, and highlight some topics where supernova theory is linked to astronomy, particle physics, and nuclear physics.

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