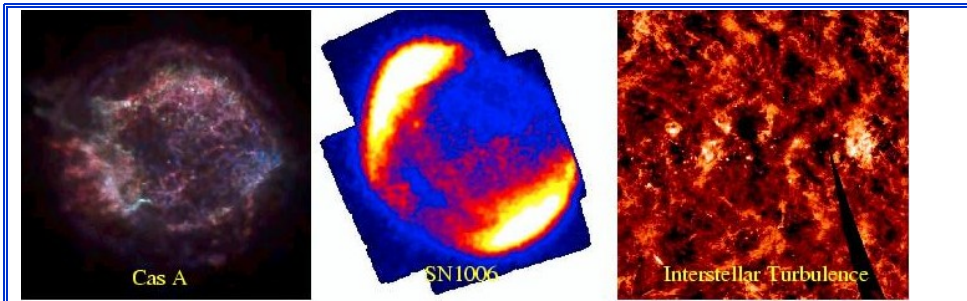


The Impact of Supernova Explosions on our Galaxy

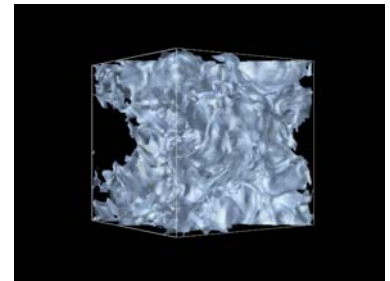


The enormous energy in a supernova explosion has a violent impact on the surrounding interstellar material. The energy released produces shocks that pass through the gas that makes up our Galaxy, making it turbulent. Images of Cas A and SN1006, both of which are remnant structures left behind by supernova explosions, show a range of morphologies. The remnants eventually produce the interstellar turbulence, shown above, which has numerous observational consequences. NSF and NASA have made an enormous investment in ground-based and space-based missions that try to study the nature of interstellar gas in x-ray, optical, infrared and radio wave-bands.

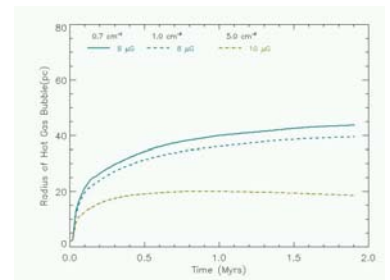
Understanding the data without a theoretical framework to guide one's thought would be near-impossible. JINA is producing the nuclear reaction rates that make it possible to understand supernova explosions. But the end result of these explosions can be seen in the turbulent mixing, dispersal of supernova ejecta and luminosity of the interstellar medium. We have developed some of the most advanced numerical capabilities for simulating the evolution of supernova remnants and their impact on the interstellar medium.

The simulations have been used to trace out the hot gas bubbles that form the x-ray emitting gas in our Galaxy. The evolution of the radius of those bubbles with time and the x-ray luminosity of interstellar gas has also been studied. These diagnostics are calibrators of the interstellar turbulence which eventually builds stars and planets like our own!

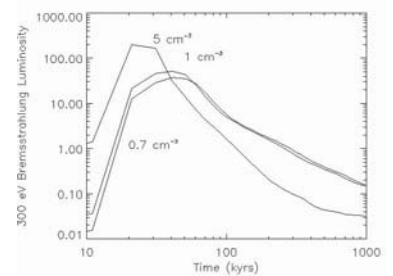
This work was supported by the Joint Institute for Nuclear Astrophysics under NSF Grant PHY02167



Simulated Interstellar Turbulence showing supernova-driven turbulent gas



Evolution of the radius of x-ray emitting hot gas bubble with time



X-ray luminosity of the remnant as a function of time

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