

Physics Department Seminar

Friday May 17th, 2013

11:00am in PhSc 15

“The Physics of Core Collapse Supernovae”

How the discussion about the stability of matter provides insight to the life cycle of stars.



Ms. Dana Baylis
Physics Major
CSU Chico

Abstract:

Where do we come from? This query is as old as the human race itself. Long before the development of science provided rational insight into the world around us, our ancestors looked up at the stars and wondered. How could they know that in the future those very same stars would provide provide the insight needed to answer this question? By studying the lives and deaths of stars, scientists discovered that we are made of nothing but star dust. Every element that we know--from the calcium in our bones and the iron in our blood, to precious metals such as silver, gold, and platinum--comes from the core of a dying star. But once a star creates these elements, how do they get dispersed into space, instead of remaining trapped inside the star? The answer is the star must end its life in a supernova explosion, one of the most violent events in the universe. This discussion will provide an introduction into the physics of core collapse supernovae. We will begin by asking the question “which stars can go supernova”, which leads into a discussion about the stability of matter. Addressing this question will lead us to an estimate of the Chandrasekhar limit, which is actually a consequence of the Pauli Exclusion Principle. Once we have established which stars can undergo supernova explosions, we will talk about the events that actually cause the core to collapse and the star to explode, leaving behind bizarre “corpses” such as neutron stars and black holes. We will finish by briefly talking about how supernova explosions influenced the evolution of our own solar system.

