Demonstrations for Supernova Explosions

Ejection of Atmospheric Layers

Materials: a basketball (or soccer ball) and a tennis ball

Demonstration: First drop each ball individually on the floor so that the students can see how far above the floor the basketball and the tennis ball rebound. Then place the tennis ball on top of the basketball and hold them out in front of you. Let go of both balls at the same time so that they fall towards the floor together. When the two balls hit the floor the tennis ball will suddenly rebound with enough energy to hit the ceiling.

Related Physics: When the core of the star implodes it contracts catastrophically, just like the imploding can. At the end of the contraction the material in the core comes together with such a large amount of force that it rebounds. As the core (represented by the basketball) contracts, all the outer atmospheric layers (represented by the tennis ball) are also contracting and following the core. They are less dense and take a little longer to contract than the core. When the core (basketball) rebounds, the atmospheric layers (tennis ball) are still in-falling towards the core. The rebounding core meets the in-coming atmospheric layers with enough energy to literally blow the atmospheric layers away from the star due to the transfer of momentum from the basketball to the tennis ball. This is the supernova explosion.