PHY983 - Nuclear Astrophysics - Spring 2013
Homework Set 8
Due: March 29, 2013 at beginning of class
Key words: supernovae

1. [4pts] Describe in 1-2 sentence bullets the major steps of a core collapse supernova from the end of Si burning to the explosion of the surface of the star (observed brightening).

2. Calculate the total energy release

> 2.1. [4 pts] from a core collapse supernova . Assume at the end of Si burning a 1.4 solar mass iron core with radius 10,000 km, and as the final compact remnant a typical neutron star with 10 km radius.
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> 2.2. [4 pts] from a thermonuclear supernova. Assume a white dwarf reaches the Chandrasekhar mass limit with a composition of 50% 16O and 50% 12C (by mass), and assume the final product of the explosion is mainly 56Ni.

3. [4 pts] Calculate the energy the shock in a core collapse supernova looses by completely dissociating a typical outer core of 0.4 solar masses. Compare with a typical shock energy of about 1% of the explosion energy from 2.1.