Stellar contributions to the chemical evolution, hydrostatic and explosive nucleosynthesis

O. Straniero[a], L. Piersanti[a], I. Dominguez[b] and A. Tumino[c]

[a] *INAF - Osservatorio d'Abruzzo,* [b] *University of Granada,* [c] *University Kore*

M_{up} is the minimum mass of a star that, after the core-helium burning, develops temperature and density conditions for the occurrence of a hydrostatic carbon burning. Stars whose mass is lower than this limit are the progenitors of C-O white dwarfs and, when belong to a close binary system, may give rise to explosive phenomena, such as cataclysm variables, novae or type Ia supernovae. Stars whose mass is only slightly larger than M_{up} ignite C in a degenerate core and, in turn, experience a thermonuclear runaway. Their final destiny may be either a massive O-Ne white dwarf or an e-capture supernova. More massive objects ignite C in non-degenerate conditions and they are are the progenitors of various type of core-collapse supernovae (IIp. IIL, IIN, Ib, Ic). In spite of its importance, a precise evaluation of M_{up} is still missing. It relies on our knowledge of various input physics used in stellar modelling, such as the plasma neutrino rate, responsible of the cooling of the core, the equation of state of high density plasma, which affects the compressibility and the consequent heating of the core, and the ^{12}C+^{12}C reaction rate. In addition Mup depends on the Initial Mass-Core Mass relation, which is determined by the extension of the convective instabilities during the H and He-burning phases (convective overshoot, semiconvection, rotational induced instabilities). Stimulated by recent results of new experimental investigations on the ^{12}C+^{12}C reaction, we will present in this talk an update of the M_{up} calculation.