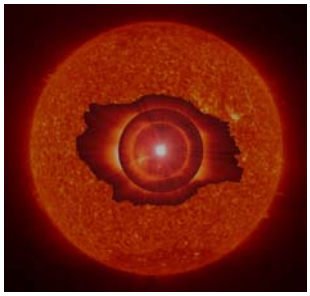
# The Origin of Fluorine



Fluorine is one of our best known elements. It is used in dentistry and house cleaning industry because it is chemically very active. Fluorine ($^{19}$F) is however also very reactive in stellar nuclear reactions, it is therefore depleted extremely rapidly at all stellar nucleosynthesis sites. The origin of fluorine therefore is unknown and speculations ran from AGB star inter-shell burning during late stellar evolution to neutrino induced production in supernova type-II explosions. Recent spectroscopic observations of post AGB stars showed strong indications of fluorine abundance in the stellar spectrum.

New experiments show that fluorine is produced in the hydrogen-helium burning shells during late stellar evolution of low mass stars. Accelerator studies of nuclear reactions on fluorine have been performed at the Notre Dame nuclear laboratory to simulate the stellar burning conditions. In particular the most important depletion reaction $^{19}$F($\alpha$,p) has been measured over a wide energy range. Extensive computer simulations of stellar nucleosynthesis based on these data show that the observed fluorine is produced in 3-4 solar mass stars independent of the initial metallicity Z.

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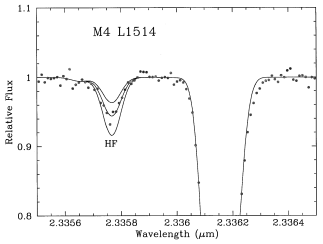
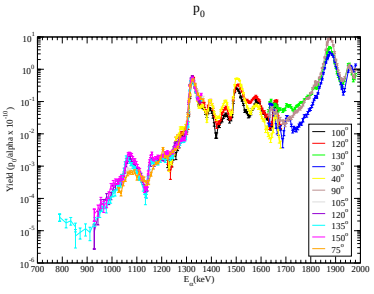
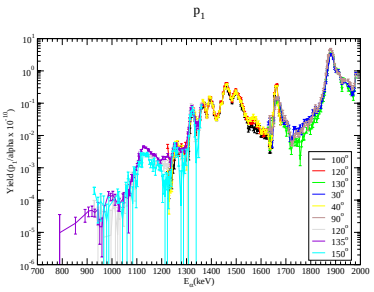



$^{19}$F observation in stellar spectra of hot post-AGB stars as L1514.




Experimental data and R-matrix analysis of $^{19}$F($\alpha$,p$_0$)$^{22}$Ne measured at different angles




Experimental data and R-matrix analysis of $^{19}$F($\alpha$,p$_1$)$^{22}$Ne measured at different angles.

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