THE STELLAR POPULATIONS OF NEUTRON AND STRANGE STARS IN THE GALAXY

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If strange matter [1] is the most stable state of cold, dense hadronic matter, the actual internal composition of compact stars would depend on the timescale τ_{ss} for the decay $n \rightarrow uds + energy$ to occur [2]. We have modelled the depletion of the neutron star population $N_{ns}(t)$ by the simple law

$$\frac{dN_{ns}}{dt} = SNII + AIC - BH - \frac{N_{ns}}{\tau_{ss}}$$

where $SNII$, AIC and $-BH$ represent birth in type II supernovae, accretion induced collapse of a white dwarf and collapse to black hole respectively. Assuming no decay of their magnetic fields (which would otherwise mask the features of a converted star), we have found two relevant solutions: $\tau_{ss} \gg 10^{10} yr$ (strongly suppressed conversion, all compact objects ns) and the other $\tau_{ss} \simeq N_{ns}(t_f)/K 10^{10} yr$, with $K = const.$ the net birthrate and $t_f \simeq$ age of the Galaxy. Under fairly different assumptions τ_{ss} turns out to be $\simeq 10^9 yr$ for the last case. Our conclusion is that the gross mismatch between τ_{ss} and the microscopic strangeness-changing reactions ($\simeq 10^{-8} s$) do not favour a mixed population, therefore suggesting a prompt birth of ss in $SNII$ explosions [3]. These objects should be then asked to provide a model for *any* pulsar observation, including glitches [4,5]. If, to avoid the above conclusion, we postulate accretion from a companion as the cause of the conversion we found that the critical density should lay within a factor ≤ 2 for any massive neutron star model. An extended version of this argument can be found in [6].

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