Study on the properties of a proto-neutron star with SU(6) symmetry

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ABSTRACT:

With the emergence of hyperons, the interaction between hyperon and hyperon needs to be considered. By considering entropy, temperature and neutrino, respectively, we investigate the properties of a protoneutron star with SU(6) symmetry under the framework of relativistic mean field theory.

Main questions and methods

- How does entropy, temperature and neutrino affect the equation of state(EOS) and properties of protoneutron star(PNS) with SU(6) symmetry ?
- Use relativistic mean field(RMF) theory to obtain the Lagrangian density.
- Obtain mass and radius by solving the Oppenheimer–Volkoff(OV) equation.
- SU(6) symmetry

$$2g_{\rho N} = g_{\rho\Sigma}, g_{\rho N} = g_{\rho\Xi}, g_{\rho\Lambda} = 0$$

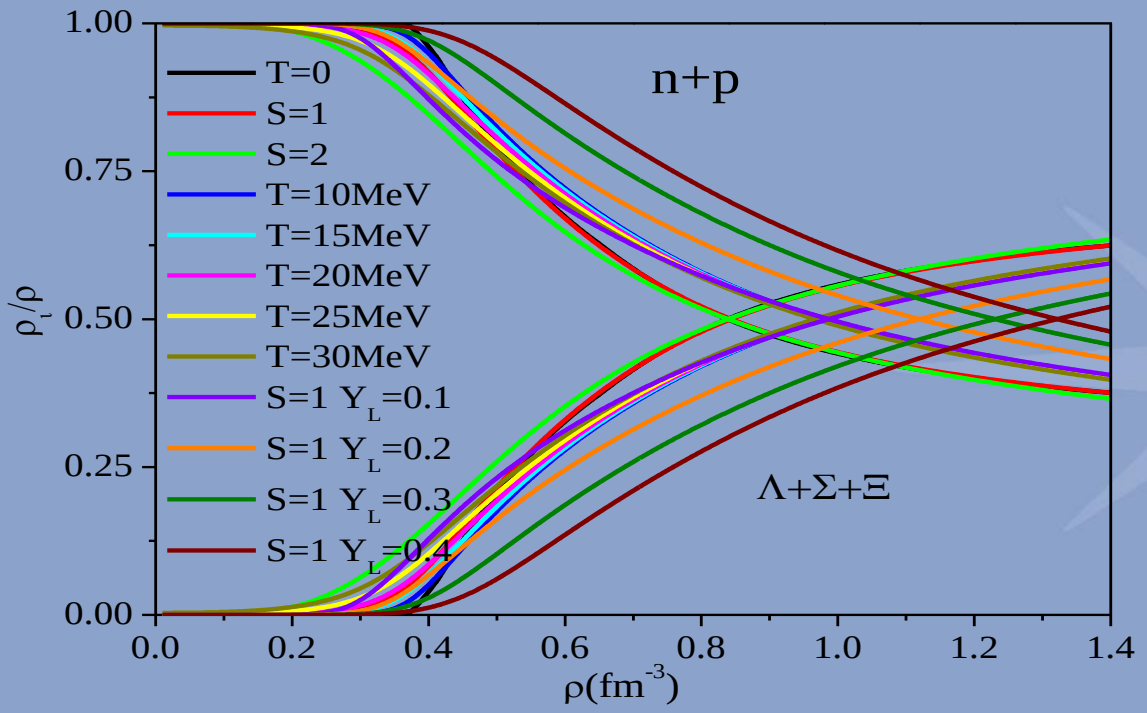
$$\frac{1}{3}g_{\omega N} = \frac{1}{2}g_{\omega\Sigma} = \frac{1}{2}g_{\omega\Lambda} = g_{\omega\Xi}$$

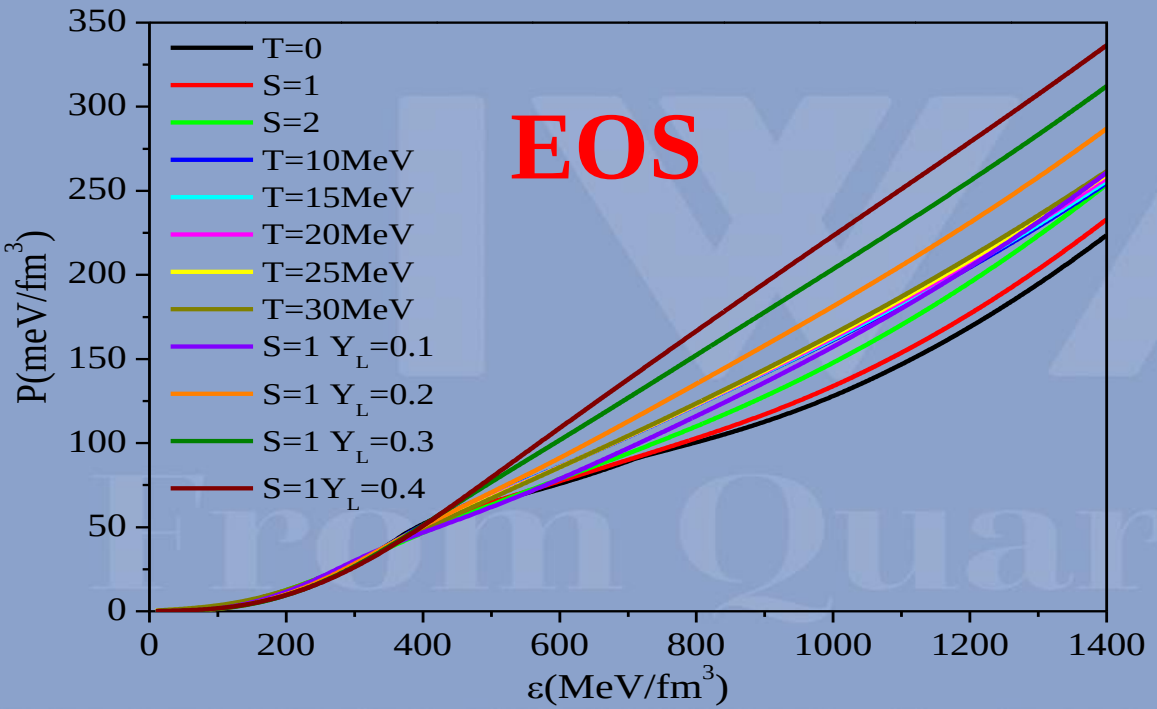
$$2g_{\phi\Lambda} = 2g_{\phi\Sigma} = g_{\phi\Sigma} = \frac{2\sqrt{2}}{3}g_{\omega N}$$

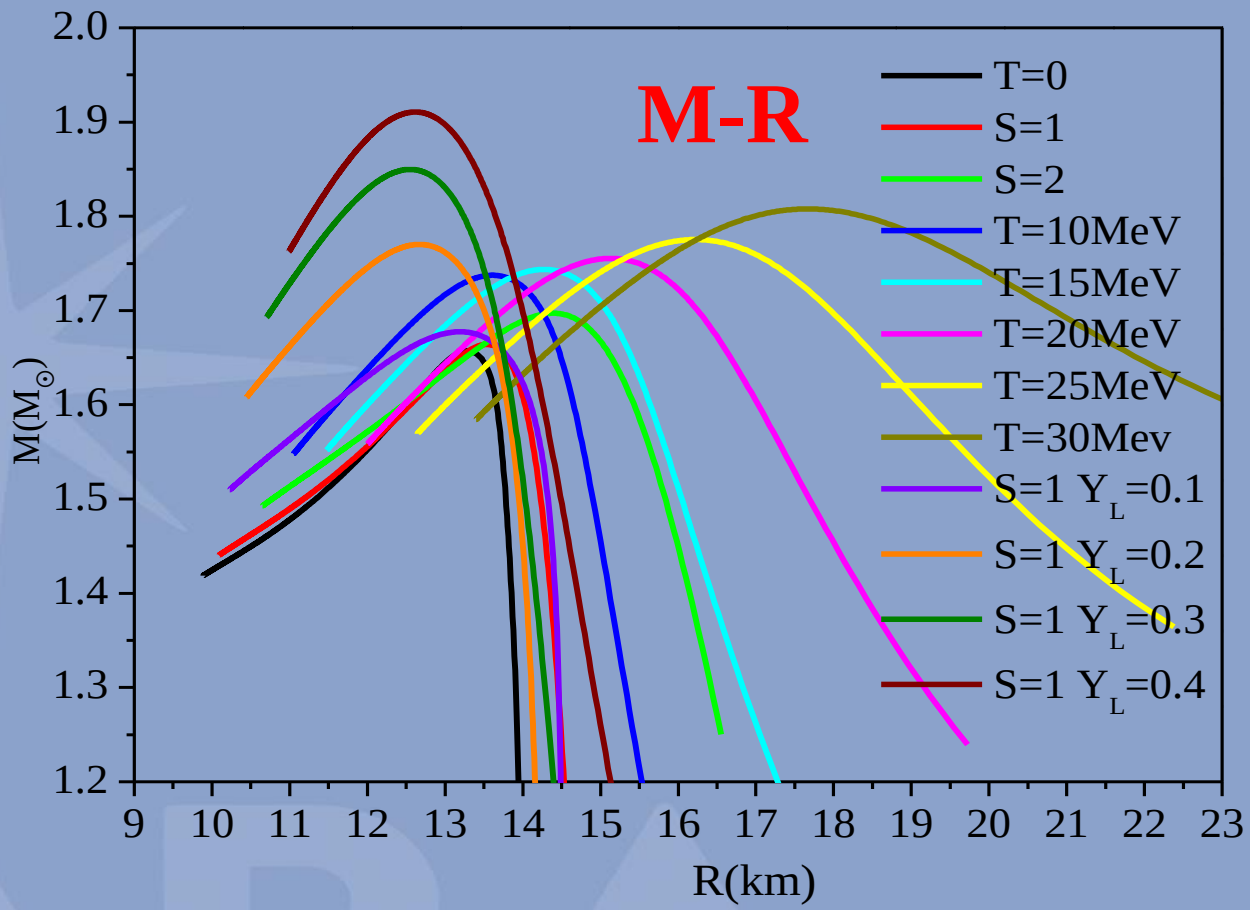
- OV equation

$$\frac{dp}{dr} = -\frac{(p+r)(M+4\pi r^3 p)}{r(r-2M)}$$

$$M = 4\pi\int^{r} \varepsilon r^2 dr$$







CONCLUSION:

Compared with entropy and temperature, neutrino has more obvious influence on the mass of PNS.