

Equation of state of dense matter and consequences for neutron stars

A.W. Thomas¹

¹*CoEPP and CSSM, School of Chemistry and Physics,
The University of Adelaide, Adelaide SA 5005*

There is currently tremendous interest in the role of hyperons and other exotic forms of matter in neutron stars. This is particularly so following the measurement by Demorest et al. [1] of a star with a mass almost 2 solar masses. Given that we know of no physical mechanism to stop the occurrence of hyperons at matter in beta-equilibrium above roughly 3 times nuclear matter density, we discuss the constraints on the possible maximum mass when hyperons are included in the equation of state [2]. The discussion includes a careful assessment of the constraints from low energy nuclear properties as well as the properties of hypernuclei. The model within which these calculations are carried out is the quark-meson coupling (QMC) model, which is derived starting at the quark level [3]. It is therefore also natural to extend considerations to the possible effect of unconfined quarks.

-
- [1] P. Demorest *et al.*, Nature **467** (2010) 1081.
[2] D.L. Whittenbury *et al.*, arXiv:1204.2614
[3] P.A.M. Guichon *et al.*, Nucl. Phys. **A601** (1996) 349