

Multinary ionic compounds in neutron-star crusts

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The outer crust of a neutron star has been generally assumed to be stratified into different layers, each of which consists of a pure body-centred cubic ionic crystal in a charge compensating electron background [1]. The validity of this assumption is examined by analysing the stability of multinary ionic compounds in dense stellar environments [2]. It is shown that their stability against phase separation is uniquely determined by their structure and their composition irrespective of the stellar conditions. However, equilibrium with respect to weak and strong nuclear processes imposes very stringent constraints on the composition of multinary compounds, and thereby on their formation. By examining different cubic and noncubic lattices, it is found that substitutional compounds having the same structure as cesium chloride are the most likely to exist in the outer crust of a nonaccreting neutron star. The formation of binary and ternary compounds in accreted crusts will be also discussed.

References

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