ENVELOPES OF NEUTRON STARS WITH STRONG MAGNETIC FIELDS

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We review the recent progress in modelling the dense, fully ionized, strongly magnetized plasmas in neutron-star envelopes, and in particular thermal transport calculations. Much of this progress has been stimulated by observations of quasi-persistent thermal emission from magnetars - neutron stars with superstrong magnetic fields. These fields profoundly affect thermodynamic and transport properties of the plasma, thereby changing the mechanical and thermal structure of the envelopes. The thermal balance in sufficiently hot neutron-star envelopes is affected by neutrino emission, which also depends on the magnetic field. We study the envelope structure for different chemical compositions, from ground-state nuclear matter to the lightest chemical elements that can sustain the temperatures and pressures under consideration. The allowance for the joint effect of the magnetic fields and chemical composition on the thermal structure of neutron star envelopes can be important for the interpretation of the magnetar thermal emission.

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