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Ferromagnetism in neutron matter

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A neutron star is one of the possible end states of a massive star. It is compressed by gravity and stabilized by the nuclear degeneracy pressure. Despite its name, the composition of these objects are not exactly known. However, from the inferred densities, neutrons will most likely compose a significant fraction of the star's interior. While all neutron stars are expected to have a magnetic field, some neutron stars ("magnetars") are much more highly magnetized than others: the inferred magnetar surface magnetic field is between 10^{14} to 10^{15} gauss.

While neutron stars are macroscopic objects, due to the extreme value of the stars' energy, pressure, and magnetic field the physics of the microscopic scale can be imprinted on the star's large scale behaviour. Hence a possible significant contribution to the superstrong magnetar magnetic field could come from a neutron ferromagnetic state in the magnetar interior.

This talk will focus on describing the thermodynamics of magnetized dense neutron matter, its equation of state, and possible observational implications for neutron stars.

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