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Keynote Address: Magnetized dense nuclear matter...far out there

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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 is 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. Thus the study of these objects are a combination of various fields of physics ranging from Quantum Mechanics to General Relativity. One of the main inputs to any calculation of neutron star properties is the equation of state of the matter that comprises the interior of the star.

This talk will focus on describing the thermodynamics of magnetized dense neutron and neutron star matter, its equation of state and composition (including exotic nuclear matter), and how the equation of state is applied to study observational consequences in neutron stars.

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