



# Physics Colloquium



Thursday, April 20<sup>th</sup> at 3:30 pm in SC 234

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## ***Highly Magnetic Neutron Stars: Bewildering Astrophysical Laboratories***

The death of massive stars leaves behind exotic compact objects that are neutron stars and black holes. Among the neutron stars, especially interesting are the Anomalous X-ray Pulsars and Soft Gamma-Ray Repeaters (SGRs), which are young neutron stars characterized by high X-ray quiescent luminosities, outbursts, and in the case of SGRs, sporadic giant flares. They are believed to be magnetars, that is neutron stars powered by ultra-strong magnetic fields. However, the diversity of their behaviours, and especially the observation of magnetar-like bursts from 'low-field' neutron stars, has been a theoretical puzzle. In this talk I will discuss results of long-term MHD simulations which by following the evolution of magnetic stresses within the neutron star crust have allowed us to relate the observed magnetar phenomenology to the physical properties of the neutron stars, and in particular to their age and magnetic field strength and topology. The dichotomy of 'high-B' field pulsars versus magnetars is naturally explained, and occasional outbursts from old, low B-field neutron stars are predicted.

Refreshments at 3:00 pm in SC 103