



THE CHINESE UNIVERSITY OF HONG KONG  
*Department of Physics*  
COLLOQUIUM

## Neutron stars: Strongest Magnets in the Universe

by



**Professor Stephen Chi Yung NG (吳志勇教授)**  
**Department of Physics**  
**The University of Hong Kong**

*Date: October 22, 2021 (Friday)*

*Time: 4:00 - 5:00 p.m.*

*Place: L2, Science Centre, CUHK*

ALL INTERESTED ARE WELCOME

\*\*\*\*\*

---

### Abstract

A massive star ends its life as a violent supernova explosion. The compact core left over could form a neutron star. Such stars are ultra-dense objects, with more massive than the Sun but a size smaller than a city. They rotate rapidly and possess the strongest magnetic field in the Universe. These remarkable properties make them ideal laboratories for studying physics under extreme conditions, such as ultra strong gravity and extreme electromagnetism, that can never be reproduced on Earth.

In this talk I will give a general overview of neutron stars and focus on effects of magnetic fields. Specifically, I will highlight some recent observational results of pulsar wind nebulae and magnetars. The former are synchrotron nebulae resulting from the interaction between neutron star's magnetized outflow and the surrounding environment. These are important local acceleration sites of cosmic rays in our galaxy. Magnetars are the most extreme class of neutron stars that can have a surface magnetic field strength up to  $10^{15}$ G, and occasionally exhibit violent radiative outbursts. I will discuss the idea to unify magnetars with other classes of neutron stars.