MONTANA STATE UNIVERSITY | College of LETTERS & SCIENCE

Physics Colloquium

Friday, February 2, 2018
4:10 – 5:00 PM
Barnard Hall (EPS) 103

The Temperature of Neutron Stars – Past, Current and Future

Professor Sachiko Tsuruta
Department of Physics
Montana State University
http://www.physics.montana.edu/people/faculty/tsuruta-sachiko.html

Abstract:
A neutron star is very tiny, with its radius only about 10 kilometers. Can we see it? Historically when we say we see a star, we mean seeing the electromagnetic radiation from the stellar surface, which can be roughly approximated as blackbody. Then for such a tiny star to be `visible', the temperature has to be very high – at least 105 – 6 K. Then if a neutron star is to be observable, we have to `see' it in X-rays. When Sco X-1, the first X-ray star, was discovered in the early 1960s therefore naturally astrophysicists around the world were excited that it may be a neutron star. The thermal evolution calculations in the mid-1960s showed that neutron star's surface radiation, in principle, should be detectable, but it will not be as strong as X-rays detected from Sco X-1. However soon after that, to our surprise neutron stars were discovered as radio pulsars. Subsequently in the 1980s more advanced instruments on board ROSAT finally detected X-rays from neutron star's surface. After summarizing these historical developments, we will introduce subsequent exciting developments in this area since then up to today, which helped our better understanding of particle physics and ultra-dense matter physics beyond the nuclear density. We will end this talk by giving progress reports on currently ongoing studies and those in the near future in this area, especially magnetar studies which will give us better understanding of strong magnetic fields.

Host: Rufus Cone

**** Refreshments served in the Barnard (EPS) second floor atrium at 3:45 ****