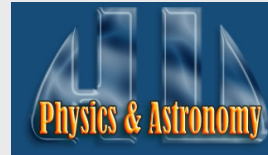


# Department of Physics and Astronomy

## Special Seminar



**Dr. Ivan Naumov**

Geophysical Laboratory, Carnegie Institution of Sciences, 5251 Broad Branch Road, Washington DC 20015

**Date:** March 19, 2018

**Time:** 3:30 p.m.

**Place:** Rm. 103, Thirkield Hall, Howard University

**Host:** Dr. Pratibha Dev

**Title: Topological phases: from topological insulators to compressed hydrogen and alkali metals**

**Abstract:** The recently established concept of “topological phases” refers to the materials with a nontrivial *bulk-edge/surface correspondence* of topological nature. In the context of solid state physics, such phases include quantum Hall insulators, topological insulators, topological semimetals, etc. In my talk, I will first review the theoretical foundation for different topological phases. I will discuss my recent results proving that compressed hydrogen and alkali metals can also be viewed as topological phases under some conditions. I will show that both dense hydrogen and insulating forms of alkali metal (or high-pressure “electrides”) have metallic surfaces that are controlled by the topology of the bulk band structure; i.e., they are topological phases. Such surface-states appear inside the bulk “direct” gap in the two-dimensional surface Brillouin zone.