

# Colloquium Notice

**Sergei Dubovsky**

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*Astrophysical Black Holes as a Probe of  
Fundamental Physics*

Advances in X-ray astronomy open the possibility for high precision spin and mass determination for astrophysical black holes starting the era of precision black hole physics. These observations turn astrophysical black holes into sensitive probes of ultra-light axion-like particles motivated by the strong CP problem and string theory.

When the axion Compton wavelength matches the black hole size, the axions develop "superradiant" atomic bound states around the black hole "nucleus" through the Penrose superradiance process. Their occupation number grows exponentially by extracting rotational energy from the ergosphere, culminating in a rotating Bose-Einstein axion condensate emitting gravitational waves. This transfer of angular momentum from the black hole to the axion condensate results in mass gaps in the spectrum of rapidly rotating black holes and gives rise to distinctive gravity wave signals.

Monday

**October 20, 2014**

Starts at 12:15 PM

Coffee at 12:00 PM

Physics Conference Room, SB B326