

# Physics Colloquium

**Professor Hal Haggard**

(Physics, Bard College)

**“The Black Hole Spin Puzzle, Random Geometries, and  
Gravitational Wave Observations”**

**Friday, October 23, 2020**

**2:30pm—3:30pm**

**Virtual Meeting**

**Meet Prof. Haggard from 3:30-4:30pm**

**Zoom link: <https://virginiatech.zoom.us/j/96084996911>**

Black hole entropy is a robust prediction of quantum gravity with no established phenomenological consequences to date. We use the Bekenstein-Hawking entropy formula and general-relativistic statistical mechanics to determine the probability distribution of random geometries uniformly sampled in phase space. We show that this statistics (in the limit  $\hbar \rightarrow 0$ ) is relevant to large curvature perturbations, resulting in a population of primordial black holes with zero natal spin. In principle, the identification of such a population at LIGO, Virgo, and future gravitational wave observatories could provide the first observational evidence for the statistical nature of black hole entropy.