



DEPARTMENT OF  
MATHEMATICS  
Illinois State University

## ISU Undergraduate Colloquium

**Time:** Thursday, November 10, 1:00 – 1:50pm

**Zoom Room ID:** 948 5899 6931

**Passcode:** ISU

**Zoom Room Link:** <https://illinoisstate.zoom.us/j/94858996931>

**Speaker:** Matt Caplan (ISU Physics)

**Title:** Collisions of Primordial Black holes and Solar System Bodies

**Abstract:** The nature of dark matter remains one of the most active open questions in physics. One popular candidate, so-called ‘primordial black holes,’ may have formed in huge numbers during the earliest seconds of the universe and persist to this today. Presently, observations place tight constraints on primordial black holes of most masses with the exception of an unconstrained asteroid-scale mass window. Such black holes would be smaller than atoms but have masses of  $10^{18}$  g, and would be so abundant that there could be dozens in the solar system at any given time. In this talk, I will present calculations of the primordial black hole collision rate with solar system objects and describe a scheme to use the lunar surface to constrain low mass primordial black holes.

**About the Speaker:** Matt Caplan is a professor of physics at Illinois State University where he studies white dwarf and neutron star interiors. Prof. Caplan received his PhD from Indiana University and his BS from the University of Virginia. From 2017 to 2019 he was a CITA National Fellow at McGill University and in 2021 he was an inaugural Fellow of the Physicists Coalition for Nuclear Threat Reduction. Beyond academia, he is a scriptwriter for PBS Digital Studios and Kurzgesagt.