Contribution ID: **121** Type: **not specified**

# Mapping the Gravitational Wave Sky from Primordial Black Holes

*Friday 11 July 2025 11:20 (20 minutes)*

Primordial black holes (PBHs) have been invoked as a component of dark matter, and PBH mergers will produce copious gravitational radiation. The future launch of the Laser Interferometer Space Antenna (LISA), an ESA/NASA gravitational wave observatory set to launch in 2035, will open a new low-frequency band of the gravitational wave sky, one that may include PBH mergers. Our work focuses on determining what LISA would observe if dark matter consisted partially of PBHs, using a high resolution cosmological n-body simulation, Romulus. Our preliminary work assumes 1% of dark matter consists of PBHs with a single mass spectrum and a binary separation distribution determined by inflationary models. We use LISAcode to calculate the signal-to-noise ratio and sky position uncertainty for each binary PBH, creating a map of the PBH sky seen by LISA. We calculate the three-point correlation function of our sky map to quantify how well PBHs trace the large scale structure of galaxies to determine how well large scale structure within LISA can probe the nature of dark matter.

**Author:** MOATS, Cassandra (Fisk University)

**Co-author:** Dr HOLLEY-BOCKELMANN, Kelly (Vanderbilt University)

**Presenter:** MOATS, Cassandra (Fisk University)

**Session Classification:** Parallel 1