To be put in the same focus session as S. Bird and E. Kovetz on the question of what could gravitational waves tell us about dark matter.

Abstract Submitted
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Searching for Signals of Merging Primordial Black Hole Binaries ILIAS CHOLIS, YACINE ALI-HAIMOUD, SIMEON BIRD, MARC KAMIONKOWSKI, ELY KOVETZ, Johns Hopkins University, VUK MANDIC, University of Minnesota, JULIAN MUNOZ, ALVISE RACCANELLI, Johns Hopkins University — It was recently advocated that the interactions of 30 solar masses primordial black holes composing the dark matter could explain the first ever observed coalescence event of BHs by the LIGO interferometers. We will discuss potential probes for such a scenario. One probe is the measurement of the eccentricities of the inspiralling binary black holes. We will show that PBH binaries are formed on highly eccentric orbits and can then merge on timescales that in some cases are years or less, retaining some eccentricity in the last seconds before the merger, which can be detected by LIGO or future Einstein Telescope by the observation of high frequency gravitational wave modes. In contrast, in massive-stellar-binaries, globular-clusters, or other astrophysical environment of binary black holes, the orbits have very effectively circularized by the time the binary enters the observable LIGO window.Finally we will discuss the possibility of detecting a signal of PBH binaries in the stochastic gravitational wave background with future gravitational wave detectors.

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