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Primordial black holes as dark matter and their detection with gravitational waves

More than twenty-two years ago, we predicted that massive primordial black holes (PBH) would form via the gravitational collapse of radiation and matter associated with high peaks in the spectrum of curvature fluctuations, and that they could constitute all of the dark matter today. In 2015, we predicted the clustering and broad mass distribution of PBH, which peaks at several Msun, and whose high-mass tails could be responsible for the seeds of all galaxies. Since then, LIGO has detected gravitational waves from ten merger events of very massive black hole binaries. We propose that they are PBH, and predict that within a few years a less than one solar mass PBH will be detected by AdvLIGO-VIRGO, and that in 10 years, an array of GW detectors (i.e. LIGO, VIRGO, KAGRA, INDIGO, etc.) could be used to determine the mass and spin distribution of PBH dark matter with 10% accuracy. Thus, gravitational wave astronomy could be responsible for a new paradigm shift in the understanding of the nature of dark matter and the evolution of the large scale structures in the universe.