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Probing Dark Matter with Space and Ground-based Gravitational Waves Detectors

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Dark matter makes up most of the matter in the universe, yet its true nature remains unknown. Gravitational wave observations open up new opportunities to search for dark matter in ways not possible before. In this talk, I will present two efforts to explore dark matter using both ground- and space-based gravitational wave detectors. First, I will introduce searches for planetary-mass compact objects in so-called "mini-EMRI" systems using data from ground-based detectors. These sub-solar mass objects are most likely to be primordial black holes—formed in the early universe—and represent a viable candidate for dark matter. Second, I will highlight the potential of future space-based detectors to probe ultralight dark matter, focusing in particular on spin-2 fields. Together, these approaches demonstrate how gravitational wave astronomy can offer fresh insights into the dark matter puzzle.

Collaboration you are representing

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