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## Probing Dark Matter, Matter-Antimatter Asymmetry, and Neutrino Masses with Gravitational Waves

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Some of the most important open questions in particle physics are: What is dark matter? What is the origin of the domination of matter over antimatter in the Universe? How are neutrino masses generated? I will discuss how gravitational wave experiments can help us probe theories proposing solutions to the above puzzles. I will concentrate on a class of models in which baryon and lepton number are promoted to the status of gauge symmetries, and provide a concrete example of a model with an  $SU(2)$  lepton gauge group. Such theories contain dark matter particles, generate the observed matter-antimatter asymmetry, and accommodate nonzero neutrino masses. Gravitational waves are generated through first order phase transitions, as well as through the dynamics of topological defects: cosmic strings and domain walls. The expected gravitational wave spectrum is within the reach of upcoming gravitational wave detectors, including LISA, DECIGO, Big Bang Observer, Cosmic Explorer and Einstein Telescope. This presents an entirely novel way of probing this type of theories, otherwise inaccessible in conventional particle physics experiments.

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