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A Search for Stochastic Gravitational Waves Backgrounds in the O1-O3 LVK Data Motivated by Domain Walls Behaviour in the Early Universe

Several theories beyond the Standard Model predict the occurrence of Domain Walls (DW), topological defects expected to arise from the breaking of a discrete symmetry in the early universe. The motion and the eventual annihilation of these objects are expected to generate a stochastic background of gravitational waves (SGWB), that could in principle be probed by ground-based GW detectors. In this work we build upon our previous search for a double-peaked domain wall motivated SGWB in the O1-O3 LVK data by introducing a novel multi-break power law function, in addition to a more intuitive parametrization of the double peak signal. We follow this mathematical implementation with a phenomenological approach, in order to place constraints on the physical parameters characterizing the DWs and to determine new parameter exclusion zones.

Secondary track

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