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Phase Transition and Gravitational Wave of Strongly Coupled Dark Sectors

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We go beyond the state-of-the-art by combining first principal lattice results and effective field theory approaches as Polyakov Loop model to explore the nonperturbative dark deconfinement-confinement phase transition and the generation of gravitational-waves in a dark Yang-Mills theory. We further include fermions with different representations in the dark sector. Employing the Polyakov-NambuJona-Lasinio (PNJL) model, we discover that the relevant gravitational wave signatures are highly dependent on the various representations. We also find a remarkable interplay between the deconfinement-confinement and chiral phase transitions. In both scenarios, the future Big Bang Observer and DECIGO experiment have a higher chance to detect the gravitational wave signals.

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