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Detecting Gravitational Waves from Comic Phase Transitions in Space

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This presentation explores the detection and analysis of stochastic gravitational wave backgrounds (SGWB) originating from first-order cosmological phase transitions, with a focus on the sound wave contributions. It begins by introducing the relevant detector configurations, including space-based interferometers like LISA and Taiji, and the construction of AET channels to extract clean gravitational wave signals. Simulated data are generated in both time and frequency domains, incorporating realistic noise and signal models. A comprehensive statistical analysis framework is developed, combining likelihood functions, Fisher matrix forecasts, and MCMC sampling to extract and constrain physical parameters. Finally, the talk connects the phenomenological gravitational wave parameters to the underlying extended Standard Model (xSM) parameters, demonstrating how SGWB observations can inform particle physics beyond the Standard Model.

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