Contribution ID: **68** Type: **not specified**

Gravitational Waves from Electroweak Phase Transition in a Z6-Symmetric Dark Matter Model

Monday 1 December 2025 15:00 (20 minutes)

We investigate the nature of the electroweak phase transition (EWPT) in a minimal Z_6-symmetric extension of the Standard Model, featuring a fermionic dark matter candidate (ψ_L, ψ_R) and a real scalar singlet (ϕ). Selecting benchmark points that satisfy both the observed dark matter relic density and direct detection constraints, we analyze whether the EWPT is first-order in this scenario. Our study demonstrates how specific parameter choices can enhance the strength of the phase transition, providing a starting point for electroweak baryogenesis. Furthermore, we compute the resulting stochastic gravitational wave background from the first-order phase transitions of our viable benchmarks and assess their detectability in future observatories such as LISA, BBO, and DECIGO.

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Session Classification: Dark Matter