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Nano-Hertz gravitational waves and sub-GeV dark matter form a nearly conformal phase transition

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The 15 year data release of the pulsar timing array (PTA) observatory NANOGrav has given decisive evidence for a stochastic gravitational wave (GW) signal at nano-Hertz frequencies. The standard astrophysical explanation of the data – merging black hole binaries – can be improved by introducing an additional cosmological source of a stochastic GW signal. An intriguing possibility for this is a first order phase transition. In this talk, I will consider a scenario where the spontaneous symmetry breaking of a classical conformal model gives rise to first order phase transition and to a stochastic GW signal that can fit the PTA data. Additionally, the symmetry breaking sources the mass of a fermionic sub-GeV dark matter candidate that can reproduce the observed relic abundance via the freeze-out mechanism. Finally I will discuss collider and cosmological constraints for the model.

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