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Domain Walls and Gravitational Waves

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I will discuss cosmological domain walls with a review of their evolution and how they produce gravitational waves. Particular attention will be devoted to melting domain walls which are described by tension red-shifting with the expansion of the Universe, so that this network eventually fades away completely. These melting domain walls emit gravitational waves with the low-frequency spectral shape favoured by the recent NANOGrav 15 yrs data. This scenario involves a feebly coupled scalar field, which can serve as a promising dark matter candidate. This ultra-light dark matter has mass below 0.01 neV which is accessible through planned observations thanks to the effects of superradiance of rotating black holes. This talk is based on recent works: arXiv:2104.13722, arXiv:2112.12608, arXiv:2307.04582 and arXiv: 2406.17053.

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