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Gravitational wave spectrum from expanding string loop on domain wall

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It is well known that spontaneous breaking of discrete symmetries produce topological objects called domain walls, which must decay in order not to dominate the energy density of the universe. One of the possible decay scenarios is nucleating holes bounded by cosmic strings on the walls. Once they are nucleated, the holes expand faster and faster by eating the energy of the domain walls and may radiate stochastic gravitational waves with significant energy fraction. This resembles cases of bubble collisions in cosmological 1st-order phase transition. We derive an analytic expression for the GW spectrum radiated from these string loops expanding on the walls. Remarkably, the spectrum is found to be proportional to frequency in UV region, in contrast to usual bubble collisions. We also discuss the implication to the NANOGrav signal and future GW observatories.

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