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Leptogenesis via Bubble Collisions

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We present a novel realization of leptogenesis from the decays of sterile (right-handed) neutrinos (RHNs) produced from runaway bubble collisions at a first order phase transition. Such configurations can produce heavy RHNs with mass many orders of magnitude above the scale of symmetry breaking, thereby enabling (non-resonant) leptogenesis without the need for high reheat temperatures while also naturally suppressing washout effects. This mechanism also extends the window of viability to RHN masses $gtrsim10^{14}$ GeV, the natural scale for type-I seesaw with $\mathcal{O}(1)$ couplings, where standard thermal leptogenesis cannot produce the observed baryon asymmetry. The corresponding phase transitions are at scales $gtrsim10^{8}$ GeV and can produce gravitational wave signals within reach of future experiments.

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