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Baryogenesis via relativistic bubble expansion

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We consider a novel baryogenesis mechanism in which the asymmetry is sourced from heavy particles which either gain their mass or are created during bubble expansion in a strong first order phase transition. The particles are inherently out-of-equilibrium and sufficiently dilute after wall crossing so — even with order one gauge interactions — the third Sakharov condition is easily met. Washout is avoided provided the reheat temperature is sufficiently below the scale of the heavy particles. We present a simple example model and discuss the restrictions on the parameter space for the mechanism to be successful. We show the reheat temperature is bounded by T_RH > 10^10 GeV for the observed asymmetry to be generated with typical vacuum energy differences expected in microphysical models (lower reheat temperatures are possible if the vacuum energy difference is further suppressed). The mechanism relies on moderate supercooling and relativistic walls which — in contrast to electroweak baryogenesis — leads to a sizable gravitational wave signal.

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