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The sphaleron rate in the electroweak crossover

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The baryon number in the Standard Model is violated by non-perturbative sphaleron transitions. At temperatures above the electroweak scale, the rate of the sphaleron transitions is unsuppressed and has been accurately measured using effective theories on the lattice. At temperatures substantially below the electroweak scale, the Higgs field expectation value is large and the sphaleron rate is strongly suppressed. Here analytical estimates are sufficient. The sphaleron rate, however, has not been calculated in the intermediate temperature range with physical Standard Model parameters. In this work we use an effective electroweak theory on the lattice with multicanonical and real-time simulation methods to calculate the sphaleron rate through the electroweak crossover at Higgs masses of 115 GeV and 160 GeV. The results are significant e.g. for leptogenesis scenarios.

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