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Implications of Topological Field Configurations for Baryon Asymmetry and Dark Matter

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Topological field solutions – such as sphaleron, monopole, and cosmic strings – can have important implications on the unsolved questions of our universe, notably the origin of baryon asymmetry and the nature of dark matter. Many baryogenesis mechanisms (for example, electroweak baryogenesis and leptogenesis) depend on sphaleron transition; consequently, a theoretical rubost and consistent computation of sphaleron rate is essential. Monopoles or cosmic strings (e.g., in Abelian–Higgs models) that arise in many beyond the Standard Model (BSM) scenarios can alter the relic abundance of WIMPs and/or axion-like particles (ALPs). I discuss recent progress in computing sphaleron rate and examine the impact of topological defects on dark-matter relic densities.

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