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Chiral Nelson–Barr Models: Quality and Cosmology

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Nelson–Barr models, which assume that CP is a spontaneously broken symmetry of nature, are a well-known solution to the strong CP problem with no new light degrees of freedom. Nevertheless, the spontaneous breaking of CP has dramatic implications in cosmology. It was recently shown that domain walls which form from this spontaneous breaking are exactly stable and must therefore be inflated away. Combined with the “quality problem”, which sets an upper bound on the CP breaking scale to avoid the effects of dangerous irrelevant operators, this puts an upper bound on the scale of inflation and the subsequent reheating temperature. In this talk, I will briefly review the Nelson–Barr solution to the strong CP problem, the quality issue, and demonstrate that minimal Nelson-Barr models are in tension with simple models of inflation and thermal leptogenesis. I will work out one way of ameliorating this tension via the introduction of a new chiral symmetry, and discuss other possibilities and avenues for future work.

Mini Symposia (Invited Talks Only)

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