

High-quality Axions and Higher Form Symmetries

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Abstract

The extra-dimensional axion solves the strong CP problem while largely avoiding the quality problem that plagues its four-dimensional counterparts. This high quality can be clearly understood in terms of the generalized global symmetries of the higher-dimensional theory. In this talk, I'll provide an overview of generalized global symmetries relevant to axions, with an emphasis on how violation of these symmetries in the ultraviolet leads to physical consequences in the infrared. I'll show that an electric one-form symmetry is entirely responsible

for protecting the potential of axions arising from 5D gauge theories and use this to systematically characterize the extra-dimensional axion quality problem. The clarity that generalized symmetries bring to the extra-dimensional axion quality problem highlights their relevance to particle phenomenology. (No prior familiarity with generalized symmetries is assumed or required.)

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3.00 pm (CEST)

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