JOINT TUFTS/MIT COSMOLOGY SEMINAR

Reining in Rampant Instanton Expansions

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Axions have remained popular tools both for phenomenology and for studying the nature of hierarchies in quantum gravity—their instanton-generated effective potentials are generally robust to local radiative corrections and so they provide a well-controlled arena in which we can study a variety of problems. How flat can we make these potentials? Experience, and some conjectural quantum gravitational constraints, suggest that we must lose control of the potential's instanton expansion if we try to make it too flat. However, it is unclear what is physically happening in this limit. Is the theory actually becoming ill-behaved, or do we just need a different way of describing it? I'll show that we lose control of the instanton expansion because states become light somewhere along the axion's field space, and I'll provide an alternative description of the effective potential that is useful even when the instanton expansion fails. A rampant instanton expansion thus represents a failure in our description of the theory, which can remain well-controlled even when this expansion is not.

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Zoom link will be distributed to joint cosmology seminar mailing list. If not subscribed see https://cosmos.phy.tufts.edu/mailman/listinfo/cosmology-seminar

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