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Gravitational form factors of a kink in 1+1 dimensional real scalar model

Tuesday 25 April 2023 18:00 (20 minutes)

Recently, experimental measurements of the energy-momentum tensor (EMT) distribution inside hadrons receive attentions their theoretical investigations are becoming increasingly important. In this presentation, focusing on localized structures in quantum field theory, we calculate the one-loop correction to the distribution of EMT around a kink in 1 + 1 dimensional ϕ^4 model and sine-Gordon model. We employ the collective coordinate method to eliminate the zero mode that gives rise to infrared divergence. The ultraviolet divergences are removed by vacuum subtraction and mass renormalization. We obtain an analytic result that is finite and satisfies the momentum conservation. The total energy of the kink obtained from the spatial integral of energy density reproduces the known result. Our EMT obtained on a finite space has a spatially-uniform term that is inversely proportional to the spatial length. We also calculate topological charge density and show that the spatial integral of 1-loop correction to topological charge density is zero.

Theory / experiment

Theory

Group or collaboration name

Primary author: ITO, Hiroaki (Osaka University)

Co-author: KITAZAWA, Masakiyo

Presenter: ITO, Hiroaki (Osaka University)

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