Contribution ID: **148** Type: **not specified**

Kink-antikink scattering in a quantum vacuum

Wednesday 27 July 2022 12:06 (18 minutes)

We study kink-antikink scattering in the sine-Gordon model in the presence of interactions with an additional scalar field, ψ, that is in its quantum vacuum. In contrast to the classical scattering, now there is quantum radiation of ψ quanta and the kink-antikink may form bound states that resemble breathers of the sine-Gordon model. We quantify the rate of radiation and map the parameters for which bound states are formed. Even these bound states radiate and decay, and eventually there is a transition into long-lived oscillons.

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Session Classification: Parallel Session C

Track Classification: Cosmology