



Contribution ID: 147

Type: Plenary/Parallel talk

Dimensional deformation of sine-Gordon breathers into oscillons

Oscillons are localized field configurations oscillating in time with lifetimes orders of magnitude longer than their oscillation period. This talk shows the deformation of one-dimensional breather solutions of the sine-Gordon (SG) equation into oscillons. SG equation is deformed by a radial damping term present in the d -dimensional Laplacian. Oscillons are evaluated (a) in a regime of perturbative corrections to the 1-D field equations, and (b) in two and three spatial dimensions. Our results show that we can only connect SG breathers and oscillons in the perturbative regime. Moreover, we show the existence of solutions with amplitude modulation, which are compatible with critical behavior near the energy threshold where solutions are no longer stable. Beyond the perturbative regime, we find that enlarging the initial parameter space is necessary to increase the availability of stable oscillons.

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Session Classification: Parallel Session Lecture Room

Track Classification: Inflation and the primordial universe