

APCTP SEMINAR

Supersymmetric Inhomogeneous Field Theories in 1+1 Dimensions

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December 30th (Thurs.) 15:00 (KST)

Online via ZOOM

We study supersymmetric inhomogeneous field theories in 1+1 dimensions which have explicit coordinate dependence. Although translation symmetry is broken, part of supersymmetries can be maintained. We consider the simplest in-homogeneous theories with one real scalar field, which possess an unbroken super-symmetry. The energy is bounded from below by the topological charge which is not necessarily nonnegative definite. The bound is saturated if the first-order Bogomolny equation is satisfied. Non-constant static supersymmetric solutions above the vacuum involve in general a zero mode although the system lacks translation invariance. We consider two inhomogeneous theories obtained by deforming supersymmetric sine-Gordon theory and ϕ^6 theory. They are deformed either by overall inhomogeneous rescaling of the superpotential or by inhomogeneous deformation of the vacuum expectation value. We construct explicitly the most general supersymmetric solutions and obtain the BPS energy spectrum for arbitrary position-dependent deformations. Nature of the solutions and their energies depend only on the boundary values of the inhomogeneous functions. The vacuum of minimum energy is not necessarily a constant configuration. In some cases, we find a one-parameter family of degenerate solutions which include a non-vacuum constant solution as a special case.

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