# Finite energy sectors of the XY-model

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All finite energy irreducible representations of the XY model for almost all parameters are determined. (1) In the interior of unique vacuum regions, the unique irreducible vacuum representation is the only finite energy representation. (2) At the critical values of the parameters, there are an infinite number of mutually nonequivalent irreducible finite energy representations. Apart from the unique irreducible ground state representation and another associated irreducible representation, an infinite number of irreducible representations arise due to an infinite number of nearly zero energy excitations of the ground state with a finite total energy and may be called infrared representations. (3) In the remaining cases, there are two additional finite energy irreducible representaions besides two irreducible ground state representations and they are topological soliton sectors with different ground state limits in positive and negative spatial infinity. For two exceptional values of parameters, they also become ground state representations.