Harold Blas, J Astrophys Aerospace Technol 2016, 4:3(Suppl)
http://dx.doi.org/10.4172/2329-6542.C1.005

Modified non-linear Schrodinger models, infinite towers of conserved charges and bright solitons

Harold Blas
Federal University of Mato Grosso, Brazil

Deformations of the focusing non-linear Schrodinger model (NLS) are considered in the context of the Quasi-integrability concept. We strengthen the results of JHEP09 (2012) 103 for bright soliton collisions. We addressed the focusing NLS as a complement to the one in JHEP03(2016)005, in which the modified defocusing NLS models with dark solitons were shown to exhibit an infinite tower of exactly conserved charges. We show, by means of analytical and numerical methods, that for certain two-bright-soliton solutions, in which the modulus and phase of the complex modified NLS field exhibit even parities under a space-reflection symmetry, the first four and the sequence of even order charges are exactly conserved during the scattering process of the solitons. We perform extensive numerical simulations and consider the bright solitons with deformed potential $V=\frac{2\eta}{2+\varepsilon}(\mp\psi^{\pm}\bar{\psi}^{\pm})^{2+\varepsilon}, \varepsilon\in R, \eta<0$. However, for two-soliton field components without definite parity we also show numerically the vanishing of the first non-trivial anomaly and the exact conservation of the relevant charge. So, the parity symmetry seems to be a sufficient but not a necessary condition for the existence of the infinite tower of conserved charges. The model supports elastic scattering of solitons for a wide range of values of the amplitudes and parameters. Since the NLS equation is ubiquitous, our results may find potential applications in several areas of non-linear science.

Biography

Harold Blas has completed his PhD in 2000 from IFT-UNESP University (Sao Paulo-Brazil) and Postdoctoral studies from IFT-UNESP, IFSC-USP. He is a Professor of Physics, at the IF-UFMT. He has published more than 25 papers in reputed journals and his research interests are Particle Physics and Mathematical Physics.

blas@ufmt.br