University of Crete
Department of Physics

Physics Colloquium

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Space-time nonlocal integrable models

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ABSTRACT

A space-time nonlocal nonlinear Schrödinger (NLS) equation was recently introduced in Phys.Rev.Lett. 110, 064105 (2013.) It was shown to be an integrable infinite dimensional Hamiltonian evolution equation. In this talk we present a detailed study of the inverse scattering transform of this nonlocal NLS equation. The direct and inverse scattering problems are analyzed along with the key symmetries of the eigenfunctions, and the conserved quantities. The inverse scattering theory is developed by using a novel left-right Riemann–Hilbert problem. Moreover, the Cauchy problem for such nonlocal NLS equation is formulated and methods to find pure soliton solutions are presented; this leads to explicit time-periodic one and two soliton solutions. A detailed comparison with the classical NLS equation is given and brief remarks about nonlocal versions of the modified Korteweg–de Vries and sine-Gordon equations are made.