Abstract Submitted
for the DAMOP12 Meeting of
The American Physical Society

Physical and Algebraic Origins of the Reflectionless Property of the Bogoliubov-de-Gennes-sine-Gordon Equation Around a Soliton[1] ALBERT ALBERT KAMANZI, ZAIJONG HWANG, MAXIM OLSHANII, University of Massachusetts Boston — We analyze the reflectionless property of the so-called Bogoliubov-de-Gennes-sine-Gordon (BdG-sG) equation—a Sine-Gordon equation that has been linearized around a single soliton solution. We demonstrate that the absence of reflection is necessary for the original nonlinear soliton be transparent for the small breathers. On the other hand, we show that the BdG-sG equation is equivalent to the Pöschl-Teller (PT) potential at transparency, whose transparency, in turn, originates from a SUSY structure of the PT Hamiltonian. Our study provides yet another example of a connection between the Supersymmetric Quantum Mechanics[2] and integrable partial differential equations, in addition to the known examples of the Lax operators for the Korteweg-de Vries, sine-Gordon, and Nonlinear Schrödinger equations that are shown to a have a SUSY structure for some few-solitonic solutions.[3]

[1]supported by ONR and NSF
[2]E. Witten, Nucl. Phys. B 188, 513 (1981)
[3]C. V. Sukumar, 1986 J. Phys. A 19, 2297 (1986); A. Koller and M. Olshanii, Phys. Rev. E 84, 066601 (2011)

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Date submitted: 31 Jan 2012 Electronic form version 1.4