

Abstract Submitted
for the DAMOP11 Meeting of
The American Physical Society

Supersymmetric Mechanism for Inversionless Property of $n/\cosh(t)$ Laser Pulse¹ ANDREW KOLLER, MAXIM OLSHANII, University of Massachusetts Boston — It is known that a two-level atom subjected to a laser pulse of the form $V(t) = V_0/\cosh(\alpha t)$ has the rare property that, for a discrete series of pulse heights, it shows no transfer of population between the levels, for any detuning of the pulse from resonance.² In particular, pulses of the form $V(t) = \hbar\alpha n/\cosh(\alpha t)$ (with n an integer) have this inversionless property. We show that the problem is analogous to reflectionless scattering in a stationary wave problem, and is linked to a potential-free Hamiltonian via a quantum-mechanical supersymmetric (QM SUSY) chain. We also explore the connection between this supersymmetric chain and the multi-soliton solutions of the sine-Gordon equation.

¹Supported by NSF and ONR.

²V. M. Akulin, “Coherent Dynamics of Complex Quantum Systems” (Springer, Heidelberg, 2006).

Andrew Koller
University of Massachusetts Boston

Date submitted: 04 Feb 2011

Electronic form version 1.4