1016-35-302 **Peter D Miller*** (`millerpd@umich.edu`), Department of Mathematics, University of Michigan, 530 Church St., Ann Arbor, MI 48109. *Caustic Curves for the N-Soliton.*

The N-soliton is the solution of the focusing nonlinear Schroedinger equation corresponding to initial data $\psi(x,0) = N\,\mathrm{sech}(x)$ for $N = 1, 2, 3, \ldots$. Under an appropriate rescaling, analysis of the N-soliton for large N amounts to analysis of the semiclassical limit of the focusing nonlinear Schroedinger equation with fixed initial data. In the rescaled problem, the central feature of the asymptotic solution is a system of "phase transition" curves in the (x,t)-plane called caustics. In joint work with Gregory Lyng (Wyoming) we show how the integrable mechanism that triggers the secondary caustic curve is quite different from that triggering the primary caustic curve. In particular, we show that while the location of the primary caustic can be predicted from the continuum limit of an associated eigenvalue distribution, that of the secondary caustic cannot. This result is characteristic of an ill-posed initial-value problem that arises as the limit of a sequence of increasingly (modulationally) unstable initial-value problems. (Received February 14, 2006)

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