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Alexander Tovbis* (alexander.tovbis@ucf.edu), Department of Mathematics, UCF, Orlando, 32816. *Towards kinetic equation for soliton and breather gases for the focusing Nonlinear Schroedinger equation.* Preliminary report.

Kinetic equation for a soliton gas for the Korteweg - de Vries equation was first proposed by V. Zakharov and later derived by G. El using the thermodynamic limit of the KdV-Whitham equations. Later, G. El and A. Kamchatnov proposed kinetic equation for the soliton gas for the focusing Nonlinear Schroedinger (fNLS) equation using physical reasoning.

In this talk, we consider the large N limit of nonlinear N -phase wave solutions to the fNLS equation subject to a certain scaling of the corresponding bands and gaps. In this limit, we obtain integral equations for the scaled wavenumbers and frequencies and, as a consequence, derive the kinetic equation for soliton and breather gases, which takes into account soliton-soliton and soliton-background interactions. Our approach can be used to derive kinetic equation for the soliton gas on the background of any finite gap solution. (Received August 21, 2018)