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Derivation of the quintic nonlinear Schrödinger equation.

In this talk we will discuss a derivation of the quintic nonlinear Schrödinger equation (NLS). More precisely, we consider a boson gas with three-body interactions in dimensions $d=1,2$ and prove that in the limit as the particle number N tends to infinity, the BBGKY hierarchy of k -particle marginals converges to a limiting Gross-Pitaevskii (GP) hierarchy for which we prove existence and uniqueness of solutions. For factorized initial data, the solutions of the GP hierarchy are shown to be determined by solutions of a quintic NLS. (Received February 20, 2010)