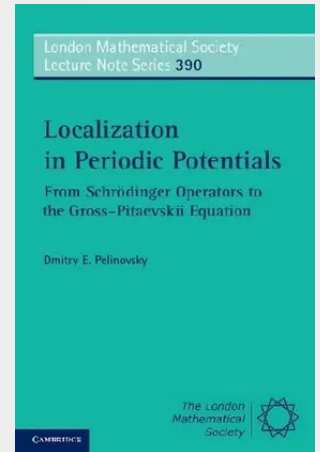


Localization in Periodic Potentials

This book provides a comprehensive treatment of the Gross–Pitaevskii equation with a periodic potential; in particular, the localized modes supported by the periodic potential. It takes the mean-field model of the Bose–Einstein condensation as the starting point of analysis and addresses the existence and stability of localized modes. The mean-field model is simplified further to the coupled nonlinear Schrödinger equations, the nonlinear Dirac equations, and the discrete nonlinear Schrödinger equations. One of the important features of such systems is the existence of band gaps in the wave transmission spectra, which support stationary localized modes known as the gap solitons. These localized modes realise a balance between periodicity, dispersion and nonlinearity of the physical system. Written for researchers in applied mathematics, this book mainly focuses on the mathematical properties of the Gross–Pitaevskii equation. It also serves as a reference for theoretical physicists interested in localization in periodic potentials.

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