Section 14: Mathematical physics

# Konstantin Pankrashkin

Institute of Mathematics, Humboldt-University of Berlin
Rudower Chaussee 25, 12489 Berlin Germany

# On semiclassical dispersion relations of Harper-like operators

Harper-like operators are quantum Hamiltonians periodic in both momentum and postion. They are important objects appearing in the study of two-dimensional periodic magnetic systems and have rich spectral properties. We describe some of their semiclassical spectral properties, which corresponds to the case of a strong magnetic field. The central point is the spectral region corresponding to the separatrices of the classical Hamiltonian, which is studied for the case of integer flux; this describes the transition between spectral regions with different asymptotic behavior. We derive asymptotic formulas for the dispersion relations and the width of the bands and the gaps, which appear to be sensitive to some topological and analytical characteristics of the Hamiltonian. In particular, we show how the absence of symmetries of the Hamiltonian influences the form of the energy bands and the ratio band-/gapwidth.