Bloch-Floquet 理論の Heisenberg 群へ拡張と熱核の長時間漸近挙動

The Bloch-Floquet theory are popular tools for the investigation of materials with periodic structures. For example, one can show that the spectrum of the periodic Schr¥"{o}dinger operators have band structures. In the context of our works, several research were done using this theory combining with some other ideas; a geometric analogue of the Dirichlet theorem for arithmetic progressions, which counts the number of prime closed geodesics in a compact manifold with negative curvature in a given homology class and a long time asymptotic expansion formula of the heat kernel for abelian extension. In this talk, I will explain our extensions of the above results to the Heisenberg group, If time permits, I want to give another mathematical explanation of the semi-classical asymptotic expansion formula for the Hofstadter butterfly of Wilkinson which is originally due to Helffer-Sjostrand.