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Spectral study of a periodic Schrödinger operator with strong magnetic field in dimension two

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The spectrum of the two-dimensional Schrödinger operator with strong magnetic field and periodic electric potential, V, is contained in a union of small intervals centered on the Landau levels. We perform a unitary conjugation by an operator constructed in such a manner that the study of the spectrum in any of these intervals is reduced to that of the spectrum of a one-dimensional pseudodifferential operator whose principal symbol is V. In a succession of papers, Helffer and Sjöstrand studied the spectrum as a set, using semiclassical methods. Here we are interested in the nature of part of the spectrum and, while preserving the unitary character of the transformations, we arrive at the direct integral of an ergodic family of operators on l2(Z) which have pure point spectrum. This constitutes an important step in understanding the nature of the spectrum of the two-dimensional periodic Schrödinger operator with strong magnetic field.

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