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*Maximal Spectral Gaps for Periodic Schroedinger Operators*

The spectrum of a Schroedinger operator with periodic potential generally consists of bands and gaps. In this paper, for fixed  $m$ , we consider the problem of maximizing the gap-to-midgap ratio for the  $m$ -th spectral gap over the class of potentials which are pointwise bounded and have fixed periodicity. In one dimension, we prove that the optimal potential is a unique step-function attaining the imposed minimum and maximum values on exactly  $m$  intervals. In two-dimensions, we develop an efficient rearrangement method for this problem and apply it to study properties of extremal potentials. Using an explicit parametrization of two-dimensional Bravais lattices, we also consider how the optimal value varies over equal-area lattices. This is joint work with Chiu-Yen Kao.