

On the spectrum of the Kronig–Penney model in a constant electric field

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Abstract. I will discuss the nature of the spectrum of the one-dimensional Schrödinger operators

$$-\frac{d^2}{dx^2} - Fx + \sum_{n \in \mathbb{Z}} g_n \delta(x - n)$$

with $F > 0$ and two different choices of the coupling constants $\{g_n\}_{n \in \mathbb{Z}}$. In the first model $g_n \equiv \lambda$ and we prove that if $F \in \pi^2 \mathbb{Q}$ the spectrum is absolutely continuous away from a discrete set of points. In the second model g_n are independent random variables with mean zero and variance λ^2 . Under weak assumptions on the distribution of the g_n we prove that in this setting the spectrum is almost surely pure point if $F/\lambda^2 < 1/2$ and purely singular continuous if $F/\lambda^2 > 1/2$. Based on joint work with Rupert Frank.