

Singular Schrödinger operators: strong coupling and geometrically induced spectrum

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We discuss the discrete spectrum of Schrödinger operators given formally by the expression $-\hbar^2\Delta - v\delta(x - \Gamma)$ in \mathbb{R}^d , $d = 2, 3$, where Γ is a smooth manifold of a lower dimension, a curve or surface, or a combination of such sets. A strong coupling (or semiclassical) expansion of the eigenvalues is derived for the case when Γ has no boundary. We also discuss more general conditions for existence of the discrete spectrum, the behaviour of band spectrum for a periodic Γ and the example of a planar loop in a homogeneous magnetic field.