On the discrete spectrum of Schrödinger operators with strong magnetic fields of compact support.

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We discuss the discrete eigenvalues of magnetic Schrödinger operators in $\mathbf{R}^2$

$$H(\lambda\vec{a}) = (-i\nabla - \lambda\vec{a})^2 + V(x), \qquad \lambda \geq 0,$$

where V is a bounded potential and $\vec{a}$ a magnetic vector potential of class C^1 in $\mathbf{R}^2$ which is such that the associated magnetic field $\mathcal{B} = \operatorname{curl}\vec{a}$ has compact support consisting in a finite number of components. The interesting case is when the flux $\int \mathcal{B}\,dx$ is non-zero. As for the unperturbed operator $H = -\Delta + V$, we consider the periodic case as well as the case where H has compact resolvent, like the harmonic oscillator.

More precisely, we study the (signed) flow of spectral multiplicity across a fixed energy level $E \in \mathbf{R}\setminus\sigma(H)$, where $\sigma(H)$ is the spectrum of H. It is shown that there exists a sequence of couplings $\lambda_k \to \infty$ such that the total signed spectral flow for $H(\lambda_k\vec{a})$ corresponds to the spectral flow for the family of operators $H + \lambda\chi_\Omega$, as $\lambda \to \infty$, where $\Omega = \{\mathcal{B}(x) \neq 0\}$.