ABSTRACT:
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We study the influence of a compactly supported magnetic field
on spectral-threshold properties of the Schroedinger operator
and the large-time behaviour of the associated heat semigroup.
We derive new magnetic Hardy inequalities in any space dimension d
and develop the method of self-similar variables and weighted Sobolev
spaces for the heat equation.

A careful analysis of the heat equation in the self-similar variables
shows that the magnetic field asymptotically degenerates
to a singular Aharonov-Bohm magnetic field, which in turn determines
the large-time behaviour of the solutions in the physical variables.
We deduce that in d=2 there is an improvement of the decay rate
of the heat semigroup by a polynomial factor with power proportional
to the distance of the total magnetic flux to the discrete set of flux
quanta, while there is no extra polynomial decay rate in higher
dimensions.