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All self-adjoint extensions of the magnetic Laplacian in nonsmooth domains and gauge transformations

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Abstract. We use boundary triples to find a parametrization of all self-adjoint extensions of the magnetic Schrödinger operator, in a quasi-convex domain Ω with compact boundary, and magnetic potentials with components in $W^1_\infty(\overline{\Omega})$. This also gives a new characterization of all self-adjoint extensions of the Laplacian in nonregular domains. Then we discuss gauge transformations for such self-adjoint extensions and generalize a characterization of the gauge equivalence of the Dirichlet magnetic operator for the Dirichlet Laplacian; the relation to the Aharonov-Bohm effect, including irregular solenoids, is also discussed. In particular, in case of (bounded) quasi-convex domains it is shown that if some extension is unitarily equivalent (through the multiplication by a smooth unit function) to a realization with zero magnetic potential, then the same occurs for all self-adjoint realizations.

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