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**The Aharonov-Bohm effect and scattering theory.** (English) Zbl 0554.47003

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The scattering of electrons off a cylinder inside which there is a current-carrying solenoid is considered. There are two different viewpoints on the description of the excluded magnetic fields and they lead to different hamiltonians. The corresponding S-matrices and scattering cross sections are found and it is shown that they differ considerably for  $R/\lambda \rightarrow 0$  ( $R = \text{cylinder radius}$ ,  $\lambda = \text{de Broglie wave length of the electron}$ ), hence an experiment could serve to verify one description and falsify the other one. The idealized situation  $R = 0$  is also studied. The S-matrices are explicitly obtained, it is shown that the results are invariant under a large class of gauge transformations and an anomalous long-range behaviour of the wave and scattering operator is pointed out.

Reviewer: V.Georgescu

**MSC:**

[47A40](#) Scattering theory of linear operators

[81U20](#) S-matrix theory, etc. in quantum theory

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[Aharonov-Bohm effect](#); [scattering of electrons off a cylinder inside which there is a current-carrying solenoid](#); [excluded magnetic fields](#); [S- matrices](#); [scattering cross sections](#)

**Full Text:** [DOI](#)

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