OPEN QUANTUM SYSTEMS FOR TWO-DIMENSIONAL MATERIALS

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The theory of open quantum systems is applied to study galvano-, thermo-magnetic, and magnetization phenomena in axial symmetric two-dimensional systems. Charge carriers are considered as quantum particles interacting with the environment through a one-body (mean-field) mechanism. The dynamics of charge carriers is affected by the average collision time that takes effectively into account two-body effects. The functional dependencies of the average collision time on the external uniform magnetic field, concentration and temperature are phenomenologically treated. Analytical expressions are obtained for the tensors of electric and thermal conductivity. The developed theory is applied to describe the Shubnikov-de Haas oscillations and quantum Hall effect in graphene and $GaAs/Al_xGa_{1-x}As$ heterostructure [1].

References

[1] E.K. Alpomishev, G.G. Adamian**,** and N.V. Antonenko *Quantum Hall and Shubnikov-de Haas Effects in Graphene within Non-Markovian Langevin Approach*. Symmetry MDPI, **16**, 7 (2024).