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Thermoelectric coefficients of two-flavor quark matter from the Kubo formalism

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This work investigates thermoelectric coefficients (electrical and thermal conductivities and thermoelectric power) of two-flavor quark matter from the Kubo formalism within the framework of the Nambu–Jona-Lasinio model. The subject of the study is quark matter under physical conditions relevant to heavy-ion collisions, where electric fields and temperature gradients are present simultaneously.

We evaluate the relevant two-point equilibrium correlators by using the Matsubara technique of the thermal field theory and applying the $1/N_c$ expansion to the multi-loop Feynman diagrams. The quark spectral functions derived previously from the one meson-exchange diagram for on-mass-shell quarks are employed.

Numerical results show that conductivities decrease with the temperature, whereas the thermopower shows the opposite behavior, thus enhancing system's capability of generating electrical voltage when subjected to a thermal gradient.

Authors: Prof. SEDRAKIAN, Armen; Dr HARUTYUNYAN, Arus (Byurakan Astrophysical Observatory, Yerevan State University); GABUZYAN, Harutyun (Yerevan State University)

Presenter: GABUZYAN, Harutyun (Yerevan State University)