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Fluctuation Nernst-Ettingshausen Effect above Ordinary/Quantum Superconducting Transition[1] ANDREI SERGEEV, SUNY at Buffalo, MICHAEL REIZER, VLADIMIR MITIN, SUNY at Buffalo — A problem of the definition of the heat transported in thermomagnetic phenomena has been well realized in the late sixties, but not solved up to date. Ignoring this problem, numerous recent theories grossly overestimate the thermomagnetic coefficients in strongly interacting systems. Here we develop a gauge-invariant microscopic approach, which shows that the heat transfer should include the energy of the interaction between electrons and a magnetic field. We also demonstrate that the surface currents induced by the magnetic field transfer the charge in the Nernst effect, but do not transfer the heat in the Ettingshausen effect. Only with these two modifications of the theory, the physically measurable thermomagnetic coefficients satisfy the Onsager relation. We critically revised the Gaussian fluctuation theory above the ordinary/quantum superconducting transition and show that the gauge invariance uniquely relates thermomagnetic phenomena in the Fermi liquid with the particle-hole asymmetry.

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