

Electrical and Thermal Hall Conductivity for Type II Weyl Semimetals

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Prior experimental results have shown that Type II Weyl semimetals have a Hall effect in the absence of a magnetic field. Therefore, we set out to investigate the electrical and thermal Hall conductivity of Type II Weyl semimetals. We found that Type II Weyl semimetals have a Nernst effect, as well as electrical and thermal Hall conductivity. We studied the linear response due to the electric field, thermal metric sensor and the momentum at the nodes, the latter acting as an axial anomaly. These three fields composed from the metric sensor, the axion momentum field and the electrical field determine the electrical and thermal Hall conductivity and Nernst effect. These findings represent the realization of the triangle diagram where the three fields are the axion momentum field, electric field and the metric sensor. Thus, we have shown that in type II Weyl semi-metals there is a quantum effect in the absence of a magnetic field.