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Thermal conductance of zero modes on the surface boundary of a Weyl semimetal

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Thermoelectric conductance of Dirac materials and in particular zero modes reveal the effect of topology. Weyl semimetals with a boundary at $z=0$ gives rise to chiral zero modes without backscattering, resulting in a significant contribution to thermal conductivity. By doping the surface with paramagnetic impurities, backscattering is allowed and the thermal conductance is suppressed. We attach a thermal reservoir at the edge of the sample and study the thermal and electrical conductance. For the ballistic and mesoscopic situations, quantum fluctuations cause oscillations of the thermal and electric conductance. The thermoelectric conductance varies periodically with the voltage bias. We compare the thermal conductance with and without magnetic impurity scattering and observe the effects of topology. An experimental set-up is proposed to test this theory.

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