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Enhanced Thermal Transport along the Nodal Direction of d-wave Superconductor $CeCoIn_5$[1] ROMAN MOVSHOVICH, DUK Y. KIM, SHIZENG LIN, FRANZISKA WEICKERT, ERIC D. BAUER, FILIP RONNING, J. D. THOMPSON, Los Alamos National Laboratory — Four-fold oscillation in thermal conductivity with respect to the direction of the magnetic field is a strong evidence of a d-wave superconductivity. Previously, a smooth oscillation was found when the thermal conductivity of unconventional superconductor $CeCoIn_5$ was measured along [100], the anti-nodal direction for its $d_{x^2-y^2}$-wave order parameter, with magnetic field rotating in the ab-plane. We present measurements of the thermal conductivity in $CeCoIn_5$ with the heat current along the [110], nodal, direction. A sharp resonance-like peak in thermal conductivity was observed when the magnetic field is also in the [110] direction, parallel to the heat current. We can qualitatively understand this zero-angle resonance within the present theory for the heat transport in d-wave superconductors. The theory, however, fails to quantitatively reproduce the details of the field-evolution of the data. The contribution of the vortex core states and Pauli limiting effect should be considered to develop a realistic theory for the thermal transport in unconventional superconductors.

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