Angle Resolved Thermal Conductivity of Superconducting CeCoIn$_5$ along the Nodal Direction$^1$ ROMAN MOVSHOVICH, DUK Y. KIM, SHIZENG LIN, FRANZISKA WEICKERT, ERIC D. BAUER, FILIP RONNING, JOE D. THOMPSON, Los Alamos National Laboratory — The thermal conductivity measurement in a rotating magnetic field is a powerful probe of the structure of the superconducting energy gap. The four-fold oscillation in thermal conductivity of CeCoIn$_5$, with the heat current in the anti-nodal direction, has revealed the d-wave nature of its order parameter. We have measured the thermal conductivity with the heat current along the [110] (nodal) direction and the magnetic field rotating in the $ab$-plane. In contrast to the smooth oscillation found with the heat current along the anti-nodal direction, a sharp increase of thermal conductivity was observed when the magnetic field is also in the [110] direction, parallel to the heat current. This suggests that the scattering of the nodal quasiparticle is strongly suppressed along the magnetic field direction. In addition, a smaller increase of the thermal conductivity was observed when the magnetic field is approximately 30 degree away from the nodal direction, perhaps due to a Fermi surface anomaly.

$^1$Work at Los Alamos was performed under the auspices of the U.S. Department of Energy, Office of Basic Energy Sciences, Division of Materials Sciences and Engineering.