Breakdown of Fourier’s law in nanotube thermal conductors

CHIH-WEI CHANG, DAVID OKAWA, HENRY GARCIA, ARUNAVA MAJUMDAR, ALEX ZETTL, Physics Department, University of California at Berkeley —

We present experimental evidence that the room temperature thermal conductivity (\(\kappa\)) of individual multiwall carbon nanotubes and boron-nitride nanotubes does not obey Fourier’s law as do ordinary thermal conductors. By varying the length (L) of the nanotube, we find that \(\kappa\) diverges as \(L^{0.6-0.9}\). Our results show that Fourier’s law is violated despite the fact that the ballistic phonon condition is not satisfied and large isotopic disorder is present.

Chih-Wei Chang
Physics Department, University of California at Berkeley

Date submitted: 22 Nov 2006 Electronic form version 1.4