THURSDAY COLLOQUIUM

Department of Physics, Tsinghua University

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Title Anomalous thermal transport in nanostructures

Speaker **Prof. Baowen Li**

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Venue **ZhengYu-Tong Lecture Hall**
&Date **16:00, March 17, 2011**

Abstract:
Thermal conductivity due to phonons in nanostructure such as nanotube, nanowire, thin film and graphene is very different from that in bulk materials. In the bulk material, phonons transport diffusively, thus the thermal conductivity is a constant - independence of material size and geometry. It depends only on composition of material and temperature. However, both theoretical and experimental studies in the past two decades have demonstrated that the thermal conductivity of nanostructure depends on size and geometry.

This size dependent thermal conductivity is generally attributed to the long phonon mean free path. People usually believe that when the system size is larger than the phonon mean free path, phonon undergoes a diffusive process thus the thermal conductivity becomes a finite constant.

In this talk, I will demonstrate by using the length dependent thermal conductivity of nanotube and nanowire that this picture is not true in low dimensional nanostructures. The thermal conductivity in such low dimensional nanostructure such as nanotube and nanowire diverges with the system length. Moreover, we can show that this divergent thermal conductivity is related to an anomalous diffusion of phonons. Both theoretical and experimental work will be presented.

Introduction to the Speaker

李保文教授于1992年获得德国Carl-von-Ossietzky Universitat Oldenburg物理学博士学位，他是国际著名非线性理论物理学家，低维热传导的世界权威。李教授目前已在国际杂志上发表了150多篇学术论文，其中包括23篇物理评论快报（Phys. Rev. Lett.），论文被引用2500多次。由于李保文教授在非线性物理和热传导方面所做的开创性工作，他获得了海外华人物理学会颁发的2004/2005亚洲成就奖。此外李教授获得的奖项和荣誉还包括2008年度NUS的Outstanding Scientist；2007 年度的新加坡World Scientific Medal and Prize ；2005年度的新加坡国家科学奖；2004年度新加坡国防科技局的Temasek Young Investigator Award 。