Abstract Submitted
for the MAR15 Meeting of
The American Physical Society

Thermal Transport in Cayley-Tree Networks[1] TSAMPIKOS KOTTOS, HUANAN LI, Wesleyan Univ, BORIS SHAPIRO, Technion — In recent years there has been a lot of attention in the microscopic derivation of the laws that dictate heat current in low dimensional systems. However, many real structures are not simple one or two-dimensional structures. Rather, they are characterized by a complex connectivity that can be easily designed and realized in the laboratory. It is therefore necessary to unveil the rules that dictate thermal transport in such networks. In this contribution we present analytical results on heat current and its thermal fluctuations for a Cayley tree consisting of two types of harmonic masses: vertex masses M where phonon scattering occurs and bond masses m where phonon propagation take place. The tree is coupled to thermal reservoirs consisting of one-dimensional harmonic chain of masses m. We find that the heat current is a non-monotonic function of the mass-ratio $\mu = M/m$. In particular, there are cases when the heat current is strictly zero below some critical value μ^*. The effects of imperfections (disorder) on the heat transport are also discussed and analyzed.

[1]This work was partly sponsored by a NSF DMR-1306984 grant and AFOSR MURI FA9550-14-1-0037 grant.

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Date submitted: 08 Nov 2014 Electronic form version 1.4