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Thermoelectric transport through a quantum nanoelectromechanical system and its backaction HANGBO ZHOU, Natl Univ of Singapore, JUZAR THINGNA, University of Augsburg, JIAN-SHENG WANG, BAOWEN LI, Natl Univ of Singapore — In recent years, nanoelectromechanical systems (NEMS) have been in the limelight of intense experimental and theoretical investigation due to their potential applications in quantum-controlled devices. In this work we study the theromoelectric transport through a single electron transistor (SET) coupled to a quantum nano mechanical resonator (NR). The effects of the quantum NR on the thermoelectric current are investigated with special emphasis on how the SET-NR coupling strength plays a role in such a NEMS. We find that the SET-NR coupling is not only able to suppress or enhance the thermoelectric current but can also switch its direction. The effect of the NR on the thermoelectric coefficients of the SET are studied and we find that even a small SET-NR coupling could dramatically suppress the figure of merits ZT. Lastly, we investigate the backaction of electronic current on the NR and possible routes of heating or cooling the NR are discussed. We find that by appropriately tuning the gate voltage the backaction can be eliminated, which could find possible applications to enhance the sensitivity of detection devices.

Hangbo Zhou
Natl Univ of Singapore

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