basque center for applied mathematics

EXCELENCIA SEVERO OCHOA

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Courses 2015-16

November 9-13, 2015: Nov. 9, 11 and 13 (9:30-11:30); Nov. 10 and 12 (15:00 to 17:00)

BCAM-Basque Center for Applied Mathematics, Bilbao, Basque Country, Spain www.bcamath.org

Jean-Bernard BRU, UPV/EHU & BCAM

FROM THE 2ND LAW OF THERMODYNAMICS TO AC-CONDUCTIVITY MEASURES OF INTERACTING FERMIONS

By using the algebraic formulation of Quantum Mechanics, we study the dynamics of interacting lattice fermions. The aim is to explain Ohm's law, at least in the AC-regime, from first principles of Quantum Mechanics and Thermodynamics (2nd law), only. Pivotal mathematical ingredients are Lieb-Robinson bounds for multicommutators. Their applications go far beyond the current linear response to electric fields studied in this course.

REFERENCES

[1] G. Emch, Algebraic Methods in Statistical Mechanics and Quantum Field Theory. New York: Willey--Interscience, 1972.
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[4] J.-B. Bru and W. de Siqueira Pedra, Lieb-Robinson Bounds for Multi--Commutators and Applications to Response Theory. Preprint mp_arc 14-27.
[5] J.-B. Bru and W. de Siqueira Pedra, Microscopic Conductivity of Lattice Fermions at Equilibrium - Part II: Interacting Particles, Preprint mp-arc (2014).
[6] J.-B. Bru and W. de Siqueira Pedra, From the 2nd Law of Thermodynamics to the AC--Conductivity Measure of Interacting Fermions in Disordered Media, to appear in M3AS: Mathematical Models and Methods in Applied Sciences 11(25) (2015).

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