Many-Body Systems out of Equilibrium

Summer Term 2024/25

Content

- Introduction: basis aspects of equilibrium Green's functions

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- Nonequilibrium Green's functions: need of a "Keldysh" contour

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- Connection with methods for Open Quantum Systems (Master equations)

Literature

- Lecture notes on Many-body and Green's functions in equilibrium
  available at `https://itp.tugraz.at/~arrigoni/vorlesungen/korrelations1/public/green.html`
  credentials: see teach center.
  See also literature therein

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- Application to molecular transport [Ryndyk et al.(2009)Ryndyk, Gutierrez, Song, and Cuniberti]
- A DFT approach [van Leeuwen et al.(2006)van Leeuwen, Dahlen, Stefanucci, Almblad

[Haug and Jauho(1998)] Haug, H., Jauho, A.-P., 1998. Quantum Kinetics in Transport and Optics of Semiconductors. Springer, Heidelberg.
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[Kamenev(2004)] Kamenev, A., 2004. Many – body theory of non – equilibrium systems, cond-mat/0412296.

[Rammer and Smith(1986)] Rammer, J., Smith, H., Apr 1986. Quantum field-theoretical methods in transport theory of metals. Rev. Mod. Phys. 58, 323–359.
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http://link.aps.org/doi/10.1103/RevModPhys.58.323

[Ryndyk et al.(2009)Ryndyk, Gutierrez, Song, and Cuniberti]

Ryndyk, D. A., Gutierrez, R., Song, B., Cuniberti, G., 2009. Green function techniques in the treatment of quantum transport at the molecular scale. In: Castleman, A. W., Toennies, J. P., Yamanouchi, K., Zinth, W., Burghardt, I., May, V., Micha, D. A., Bittner, E. R. (Eds.), Energy Transfer Dynamics in Biomaterial Systems. Vol. 93 of Springer Series in Chemical Physics. Springer Berlin Heidelberg, pp. 213–335.
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van Leeuwen, R., Dahlen, N. E., Stefanucci, G., Almbladh, C.-O., von Barth, U., 2006. Introduction to the Keldysh Formalism. Vol. 706 of Lect. Notes. Phys. Springer-Verlag, Berlin, Ch. 3, pp. 33–59.