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Technische Universität Berlin
Institut für Theoretische Physik
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www.itp.tu-berlin.de/stat-i-ss07.html

2. Übung/Projekt zur Stat. Phys. I, computational methods

Counting Statistics

Exercise

- Revise the connection between cumulants and moments of a probability distribution.
- Calculate the Full Counting Statistics (FCS), i.e. the cumulant generating function, for electron transport through a single resonant level.
- Use the above result in order to extract a few moments of the distribution $p_n(0,t)$ for n electrons having tunneled after large times t.
- Calculate $p_n(0,t)$ for the above system numerically (large times t) and plot the result appropriately.

Project II

Derive the Master equation, including vibrational coherences, for a simple NEMS (nanoelastomechanical system) of your choice (discussion with tutor/lecturer). Calculate the Full Counting Statistics and thereby discuss the noise properties of your system.

Other Projects to Follow

- One project on the NRG (numerical renormalisation group). This will start in one or two weeks.
- Classical electrolytes: possibly at the end of this course - would require some work during the holidays.

NOTE:
Exercises should be done by all participant. Projects are for those who wish to get a 'Schein', or for those who wish to apply the material in the Lecture Notes to some interesting problems. These projects are related to some recent research in our group.

Bitte Rückseite beachten!⟶

- **Internetseite der Veranstaltung:** http://www.itp.tu-berlin.de/stat-i-ss07.html
- **Vorlesung:** Mittwoch 12:15 - 14:00 Uhr im PN 201 und Donnerstag 14:15 - 16:00 Uhr im PN 731
- **Tutorium:** Dienstags 8:30 - 10:00 Uhr im PN 731
- **Scheinkriterien:** Erfolgreiche Teilnahme an den Übungen und erfolgreiche Durchführung eines Projektes
- **Sprechstunden:**
  - Prof. Dr. Tobias Brandes: Montags, 13:00 - 14:00 Uhr
  - Philipp Zedler: Mittwoch, 11:00 - 12:00 Uhr
- **Literatur:**
  - Vorlesungsskript (web-page)
  - H. Carmichael, An Open System Approach to Quantum Optics
  - D. F. Walls and G.J. Milburn, Quantum Optics
  - U. Weiss, Quantum Dissipative Systems
  - H. Haug and A. P. Jauho, Quantum Kinetics in Transport and Optics of Semiconductors
  - F. Haake, Quantum Signatures of Chaos
  - A. J. Leggett, S. Chakravarty, A. T. Dorsey, M. P. A. Fisher, A. Garg and W. Zwerger, Rev. Mod. Phys. **59**, 1 (1987)
  - Literatur zur NRG wird später angegeben.