

# Seminar on quantum mechanics

SS 2018 — Joerg Jaeckel and Jan Martin Pawłowski

Thursday, 14:00 - 16:00, Philosophenweg 12, R 105

Interested in giving a talk? Send an email to: [j.jaeckel@thphys.uni-heidelberg.de](mailto:j.jaeckel@thphys.uni-heidelberg.de)  
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## Topics:

### 19.04. Preliminaries

### 26.04. Path integral

*Keywords:*

*Literature:*

- L.H. Ryder, Quantum Field Theory, Cambridge UP (1996)
- M.E. Peskin, D.V. Schroeder, An Introduction to Quantum Field Theory, Westview Press (1995)

*Speaker: Patrick Jentsch*

*Tutor: Stefan Lippoldt*

### 03.05. Bose-Einstein condensation

*Keywords:*

*Literature:*

- T. Fliessbach, Statistische Physik, Springer (1993)
- L.D. Landau and E.M. Lifschitz, Statistical Physics (Vol. 5), Pergamon (1959)
- F. Schwabl, Statistical Mechanics, Springer (2002)

*Speaker: Malte Wehrheim*

*Tutor: Viraf Mehta*

### 10.05. Ascension

### 24.05. Perturbation theory

*Keywords:*

*Literature:*

- F.J. Dyson, Divergence of perturbation theory in quantum electrodynamics, Phys. Rev. 85, 631 (1952)
- J.P. Boyd, The Devil's Invention: Asymptotic, Superasymptotic and Hyperasymptotic Series, Acta Applicandae Mathematicae 56, No. 1, 1 (1999)

*Speaker: Bauer*

*Tutor: Viraf Mehta*

31.05. **Corpus Christi**

07.06. **Relativistic QM: Klein-Gordon & Dirac equations**

*Keywords:*

*Literature:*

- A. Messiah, Quantum Mechanics Volume II, North Holland (1975), Ch. 20
- O. Nachtmann, Elementary Particle Physics - Concepts and Phenomena, Springer (1990), Ch. 4
- J.D. Bjorken and S.D. Drell, Relativistic Quantum Mechanics, McGraw-Hill (1964), Ch. 1,2

*Speaker: Renkert*

*Tutor: Stefan Lippoldt*

28.06. **Entropy**

*Keywords:*

*Literature:*

- F. Schwabl, Statistical Mechanics, Springer (2002)
- P. Coles et al., Entropic uncertainty relations and their applications, Rev. Mod. Phys. 89, 015002 (2017)
- M.M. Wilde, Quantum Information Theory, Cambridge UP (2017)

*Speaker: Michael Straub*

*Tutor: Manuel Reichert*

05.07. **Anharmonic Oscillator & instantons**

*Keywords:*

*Literature:*

- T. Schäfer and E.V. Shuryak, Instantons in QCD, Rev. Mod. Phys. 70, 323 (1998)

*Speaker: Holsten*

*Tutor: Manuel Reichert*

05.07. **Entanglement entropy & Qbits**

*Keywords:*

*Literature:*

- M. Le Bellac, Quantum Physics, Cambridge UP (2006)
- M.A. Nielsen, Quantum Computation and Quantum Information, Cambridge UP (2010)

*Speaker: Johannes Kröner*

*Tutor: Manuel Reichert*

12.07. **Aharanov Bohm effect & Berry phase**

*Keywords:*

*Literature:*

- F. Schwabl, Quantenmechanik, Springer (1993), Ch. 7.5
- Aharonov, Bohm, Significance of electromagnetic potentials in the quantum theory, Phys. Rev. 115, 485 (1959)
- A. Tonomura et al., Observation of Aharonov-Bohm Effect by Electron Holography, Phys. Rev. Lett. 48, 1443 (1982)

*Speaker: Niklas Merk*

*Tutor: Stefan Lippoldt*

12.07. **Einstein-Podolsky-Rosen**

*Keywords:*

*Literature:*

- F. Schwabl, Quantenmechanik, Springer (1993), Ch. 7.5
- A. Einstein, B. Podolsky and N. Rosen, Can Quantum-Mechanical Description of Physical Reality Be Considered Complete?, Phys. Rev. 47, 777 (1935)

*Speaker: Melda Akyazi and Kokron*

*Tutor: Manuel Reichert*