

1 List of topics for the final exam

1. Fouriertransform
2. Dealing with vectors and operators in “Bra-Ket”-notation, calculation of commutators, meaning of commutators.
3. Definition of hermitian and unitary.
4. Wave-function, in general, sketching, qualitative properties.
5. Gaugetransform of wave-functions, coupling to electromagnetic fields, Aharonov-Bohm-effect.
6. Uncertainty relation, position- and momentum-operator.
7. Solving of eigenvalue-problems. Meaning of eigenvalues and eigenfunctions. Properties of them.
8. Free particle and Gaussian wave-packet.
9. Solving of examples involving potentials under consideration of boundary- and connection-conditions.
10. Periottic potentials.
11. Tunneling effect.
12. Calculation of expectations-values and their statistical dispersion.
13. Time-evolution.
14. Harmonic oscillator, destroyer-, generator- and numberoperator.
15. WKB-approximation.
16. Angular momentum, angular-momentum operators, ladderoperators for angular momentum.
17. Spin, Pauli-matrices, spin-operators, spin in magnetic field.
18. Addition of angular momentum, Gordon/Clebsch-Coefficients.
19. Identical particles, Pauli exclusion principle, Bosons and Fermions, many-particle wave-function.
20. H-atom.
21. Perturbation theory (degenerated and non-degenerated).

2 Exam

1. The exam will take place on 17.7 at 14:15 in the lecture rooms of the anatomy.
2. Participants from groups 1-7 please proceed to lecture room A, participant from groups 8-13 (particular group 10 which is the english one) please proceed to lecture room B.
3. We do not allow the use of calculators, books, etc. Paper will be provided by us.

Good luck at the exam!