

Statistical Physics 2 schedule, Fall 2022-23

Week	Dates	Dates2	Topics	Topics2
hét	Tue 16:00-17:30	Fri 08:30-10:00	Tuesday 16:00-17:30	Friday 08:30-10:00
1	September 6, 2021	September 9, 2021	Part 1: Phase transitions L1: Ferromagnetic transition (revision); conditional free energy, Ginzburg-Landau theory	
2	September 13, 2021	September 16, 2021	T1: Mean field (from free energy): ferro Ising, antiferro Ising, Heisenberg	L2: Scaling functions, exponents and connection between critical exponents. Correlations, linear response
3	September 20, 2021	September 23, 2021	T2: 2-spin cluster, crit. exponents in Landau theory, scaling functions in mean field theory, tricritical point	L3: Scaling and renormalization group
4	September 27, 2021	September 30, 2021		Test 1 (theory + exercises): Phase transitions
5	October 4, 2021	October 7, 2021	L4: Superfluidity I: basic phenomena, Tisza theory, Gross-Pitaevskii theory	L5: Superfluidity II: healing length, vortices, rotons, explanation of superfluidity, time dependent Gross-Pitaevskii equation
6	October 11, 2021	October 14, 2021	Part2: Q-statistical physics: L6: Density operator coupled spins, density operators, mixed and pure states	L7: General structure of density matrix Neumann equation (spin in external field) Time averages and equilibrium structure of DM
7	October 18, 2021	October 21, 2021	T3: Density operator	T4: Neumann equation, Lindblad equation(?), Principle of maximal entropy
8	October 25, 2021	October 28, 2021	L8: Dissipative spin dynamics, spin relaxation, Neumann entropy, and the principle of maximal entropy	Test 2 (theory + exercises): Density operator, max. ent. principle
9	November 1, 2021	November 4, 2021	SZÜNET	Part2: Nonequilibrium stat. phys. L9: Generalized dynamical susceptibility, Linear response theory, Kubo formula
10	November 8, 2021	November 11, 2021	L10: Time dependent correlations, classical noise, quantum noise	L11: FDT, classical limit, Onsager's regression hypothesis, Johnson noise of resistive circuits
11	November 15, 2021	November 18, 2021	L12: H-theorem and relaxation to equilibrium Monte Carlo simulations: Detailed balance, MC sampling, Metropolis algorithm, simulated annealing	Test 3 (theory only): linear response, Kubo formula, noise
12	November 22, 2021	November 25, 2021	L13: Brownian motion, diffusion and Langevin equation	University Open Day
13	November 29, 2021	December 2, 2021	L14: Fokker-Planck equation, velocity relaxation and generalized diffusion equation, Boltzmann equation?	T5: Diffusion equation
14	December 6, 2021	December 9, 2021		Test 4 (theory + exercises): Langevin eq., diffusion eq.
15	December 13, 2021	December 16, 2021		Test Retake (2 out of 7)