Statistical Physics 2 schedule, Fall 2021-22

Week	Lectures	Tutorials	Lecture topics	Tutorials topics
hét	Tue 16:15-17:45	Fri 10:15-11:45	Tuesday 16:15-17:45	Friday 10:15-11:45
1	September 7, 2021	September 10, 2021	**Part 1: Phase transitions** L1: Ferromagnetic transition (revision); conditional free energy, Ginzburg-Landau theory	T1: Mean field (from free energy): ferro Ising, antiferro Ising, Heisenberg
2	September 14, 2021	September 17, 2021	T2: 2-spin cluster, crit. exponents in Landau theory, scaling functions in mean field theory, tricritical point	L2: Scaling functions, exponents and connection between critical exponents. Correlations, linear response
3	September 21, 2021	September 24, 2021		L3: Scaling and renormalization group
4	September 28, 2021	October 1, 2021	L4: Superfluidity I: basic phenomena, Tisza theory, Gross-Pitaevskii theory	**Test 1 (t**heory + exercises): Phase transitions
5	October 5, 2021	October 8, 2021	L5: Superfluidity II: healing length, vortices, rotons, explanation of superfluidity, time dependent Gross-Pitaevskii equation	**Part2: Q-statistical physics:** L6: Density operator coupled spins, density operators, mixed and pure states
6	October 12, 2021	October 15, 2021	L7: General structure of density matrix Neumann equation (spin in external field) Time averages and equilibrium structure of DM	T3: Density operator
7	October 19, 2021	October 22, 2021	L8: Dissipative spin dynamics, spin relaxation, Neumann entropy, and the principle of maximal entropy	T4: Neumann equation, Lindblad equation(?), Principle of maximal entropy
8	October 26, 2021	October 29, 2021	**Part2: Nonequilibrium stat. phys.** L9: Generalized dynamical susceptibility, Linear response theory, Kubo formula	L10: Time dependent correlations, classical noise, quantum noise
9	November 2, 2021	November 5, 2021	L11: FDT, classical limit, Onsager's regression hypothesis, Johnson noise of resistive circuits	**Test 2** (theory + exercises): Density operator, max. ent. principle
10	November 9, 2021	November 12, 2021	L12: H-theorem and relaxation to equilibrium Monte Carlo simulations: Detailed balance, MC sampling, Metroplolis algorithm, simulated annealing	
11	November 16, 2021	November 19, 2021	TDK Konerencia	**Test 3** (theory only): linear response, Kubo formula, noise
12	November 23, 2021	November 26, 2021	L13: Brownian motion, diffusion and Langevin equation	University Open Day
13	November 30, 2021	December 3, 2021	L14: Fokker-Planck equation, velocity relaxation and generalized diffusion equation, Boltzmann equation?	T5: Diffusion equation
14	December 7, 2021	December 10, 2021		**Test 4** (theory + exercises): Langevin eq., diffusion eq.
15		December 17, 2021		