Statistical Physics 2 schedule, Fall 2020-21

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 8, 2019	September 11, 2019	**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 15, 2019	September 18, 2019	L2: Scaling functions, exponents and connection between critical exponents. Correlations, linear response	T2: 2-spin cluster, crit. exponents in Landau theory, scaling functions in mean field theory, tricritical point
3	September 22, 2019	September 25, 2019	L3: Scaling and renormalization group	
4	September 29, 2019	October 2, 2019	L4: Superfluidity I: basic phenomena, Tisza theory, Gross-Pitaevskii theory	
5	October 6, 2019	October 9, 2019	L5: Superfluidity II: healing length, vortices, rotons, explanation of superfluidity, time dependent Gross-Pitaevskii equation	**Test 1**: Theory + Excercises (Phase transitions)
6	October 13, 2019	October 16, 2019	**Part2: Q-statistical physics:** L6: Density operator coupled spins, density operators, mixed and pure states	T3: Density operator, mutual information(?), Neumann equation, Lindblad equation(?)
7	October 20, 2019	October 23, 2019	L7: General structure of density matrix Neumann equation (spin in external field: in tutorial) Time averagres and equilibrium structure of DM	National holiday
8	October 27, 2019	October 30, 2019	L8: Dissipative spin dynamics, spin relaxation, Neumann entropy, and the principle of maximal entropy	T4: Principle of maximal entropy
9	November 3, 2019	November 6, 2019	**Part2: Nonequilibrium stat. phys.** L9: Properties of enealized dynamical susceptibility, Linear response theory, Kubo formula	**(?) Test 2** (theory + excercizes): (Density operators and principles of maximal entropy)
10	November 10, 2019	November 13, 2019	L10: Noise: Classical noise, quantum noise, and the FDT	
11	November 17, 2019	November 20, 2019	L11: Classical limit of FDT: Onsager's regression hypothesis, Johnson noise of resistive circuits	
12	November 24, 2019	November 27, 2019	**(?)Test 3** (45 minutes, theory only) + handouts for simulation homework + **Short lecture:** Markov-process, Master equation, H-theorem	University Open Day
13	December 1, 2019	December 4, 2019	L13: Brownian motion, diffusion and Langevin equation	T5: Diffusion equation
14	December 8, 2019	December 11, 2019	L12: H-theorem and relaxation to equilibrium Monte Carlo simulations: Detailed balance, MC sampling, Metroplolis algorithm, umbrella sampling	L14: Fokker-Planck equation, velocity relaxation and generalized diffusion equation
15		December 18, 2019		**(?) Test 4**