

Material for Week 9

Physics 4488/6562: Statistical Mechanics

<https://sethna.lassp.cornell.edu/Teaching/562/>

Exercises due Mon. Mar 28

Last correction at January 11, 2022, 9:13 pm

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For next Monday's pre-class question 9.2, do parts (a) and (b) only.

Monday

In-class question: [8.19](#) *2D Ising cluster expansions*

Wednesday

Read: Chapter 9, Sec. 9.1 (Broken symmetry) and 9.2 (Order parameter)

Pre-class question: [9.9](#) *Ising order parameter*

In-class question: [9.10](#) *Nematic order parameter*

Friday

Read: Chapter 9, Sec. 9.3 (Examine the elementary excitations)

Pre-class question: [9.15](#) *Superfluid second sound*

In-class question: [9.6](#) *Symmetries and wave equations*

Monday

Read: Chapter 9, Sec. 9.4 (Classify the topological defects)

Pre-class question: [9.2](#) *XY defects*

Exercises for everyone (4488 and 6562)

[8.6](#) *Metropolis.*

[8.8](#) *Wolff.*

[8.21](#) *Fruit flies and Markov.*

Gordon Berman (Cornell PhD) used machine learning to study fly behavior, inspiring this exercise.

Exercises for Graduate Course (6562 only)

[9.5](#) *Landau theory for the Ising model.*

[9.20](#) *Number and phase in superfluids.*