



Vorlesungsankündigung Wintersemester 2024/25

Theory of Critical Phenomena: An Introduction to the Renormalization Group (MSc Physik 5700170)

Dozenten: Dr. Horst-Holger Boltz (Horst-Holger.Boltz@uni-greifswald.de)
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Beschreibung: An introduction into the theory of critical phenomena beyond introductory statistical mechanics classes with a particular focus to renormalization methods. This lecture is planned as a rather gentle introduction into some advanced and still very active concepts in statistical physics. It is intended for students of physics who have taken a first statistical physics course (e.g. TP4). There are no other prerequisites (particularly no knowledge in quantum field theory is assumed). As most of the literature is in English, the lecture will be as well (unless there is a unanimous vote to the contrary).
Given interest, there is plenty of room for optional exercise problems (numerical and analytical).

Vorlesung: DI 12:00-14:00 Uhr KSR

Literatur: Renormalization techniques are pervasive in modern physics and, thus, there is a plethora of literature. Quite a lot of that coming from or going into different directions. The lecture is heavily drawing (not limited to the title) from Binney, Dowrick, Fisher, Newman; The theory of Critical Phenomena: An Introduction to the Renormalization Group, Oxford University
Other candidates
McComb; Renormalization Methods - A Guide for Beginners, Oxford
Herbut; A Modern Approach to Critical Phenomena
Kopietz, Bartosch, Schütz; Introduction to the Functional Renormalization Group, Springer (this is available electronically through the university library, do not let the title deter you, there is also an introduction into more basic renormalization)
Any Textbook on statistical physics will cover critical phenomena in some way, that is sufficient as a motivation to get started.
As the lecture progresses, more specific literature references (monographs and scientific papers) will be given.