Syllabus for **Renormalisation Group**

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Homework will be due on the Fridays in weeks 2,4,6,8 (possibly the last two assignments will be combined into a single one). It will be posted on the webpage during the preceding week.

Recommended Texts:

J. Cardy, *Scaling and Renormalization in Statistical Physics*

N. Goldenfeld, *Lectures on Phase Transitions and the Renormalization Group*

I will post some incomplete lecture notes on the web as part of a book *Modern Statistical Mechanics* I'm allegedly writing. The notes can be found at http://users.ox.ac.uk/~phys1116/book.html

Other Writings:

K. Wilson, Nobel Prize lecture "The Renormalization Group and Critical Phenomena", Rev. Mod. Phys. **47**, 773-840 (1975), also available at www.nobelprize.org. Read an overview from the man himself.

K. Wilson and J. Kogut, "The Renormalization group and the epsilon expansion", Physics Reports 12C, 75-200 (1974).
The review article from which many learned the subject.

J. Cardy, "The Legacy of Ken Wilson", arXiv:1308.1785.
A very nice short summary of Wilson's accomplishments.

S.-K. Ma, *Modern theory of critical phenomena*
An early classic.

R. Pathria, *Statistical Mechanics*
The latter part of the book has a nice introduction to critical points and mean-field theory. The application of the block-spin technique to the 2d Ising model done in class comes from here.

Overview:

As apparent from above, the main point of this class is to introduce the renormalisation group. The RG is not only the way to understand critical phenomena quantitatively, but lies at the very core of why theoretical physics is so effective. I will roughly follow Cardy's book. The aim is to get through chapter 6, but I will insert several topics not present in the book, in particular the block-spin technique.