Changes in lecture notes from 2013 to 2014 versions

Here I list the changes made in the lecture notes from the 2013 to 2014 versions. As far as the exam-relevant material is concerned the changes are mostly cosmetic, but there are a few clarifications.

- **Second quantization**
  - Corrected a typo in the definition of the factorial function after Eq. (10).
- **Tight-binding model for electrons in a crystal**
  - In the 2013 version it was really just Sec. 2 + appendix of these notes that referred to the tight-binding model. Thus the introduction + Sec. 1 was removed in the 2014 version.
  - Removed the paragraph discussing the "Kamiltonian" (about the grand canonical ensemble), as this material was not lectured at that point in the course. (It was instead covered in Sec. 2.2 in the Green function notes.)
  - A few cosmetic changes in the text following Eq. (13).
- **The Hubbard and Heisenberg models, spin-wave theory of ferro- and antiferromagnets, broken symmetry and Goldstone modes**
  - The discussion in Sec. 1.2.1 was made a little more general, as the new version does not from the outset restrict attention to the subspace with an equal number of up- and down-spin electrons.
  - Added Sec. 1.2.2 with the detailed derivation (using projection operators) of the $S = 1/2$ Heisenberg antiferromagnetic model from the half-filled Hubbard model in the strong-interaction limit. As also stated elsewhere, the material involving these projection operators is not examinable.
  - A trivial change in Eq. (72) and on the second line following it.
  - The first paragraph in Sec. 6.1 is somewhat rewritten and expanded. The lecture notes on transformations and symmetries are referred to, and a proof is given for the invariance of the Heisenberg Hamiltonian under global spin rotations.
  - The question of how spontaneous symmetry breaking is possible is briefly discussed in a new paragraph at the end of Sec. 6.1 (in the previous version it was just mentioned in a footnote).

- **Transformations and symmetries in quantum mechanics**
  - The verb 'effect' was replaced with 'produce' throughout the document.
- **Introduction to Green functions and many-body perturbation theory**
  - On the first line of Sec. 2.5, clarified the meaning of "diagonal" and corrected a typo.
  - In Eq. (82) and the three expressions immediately before it, ip_n was changed to ip_ℓ, and a footnote explaining why was added.
  - In the first paragraph of Sec. 4.4 the remarks concerning "self-averaging" were modified.
  - At the beginning of Sec. 4.8 the explanation of the analytic continuation in Eqs. (151)-(154) was clarified.

The following files were not changed:

- **Second quantization representation for the Hamiltonian of an interacting electron gas**
- **Noninteracting electrons. The free electron gas**