

SK2905 – Superconductivity and other quantum liquids, 7.5 credits

Course analysis - autumn 2020

Basic information

The course was given in period 2, autumn 2020, and had 8 active students. Course responsible was Magnus Andersson. The course consisted of two parts: INL1 (3.0 credits): The examination consisted of one group hand-in assignment and one individual hand-in assignment
TEN1 (4.5 credits): Group assignments based on home hand-in problems (50%) and on evaluations of two suggested superconducting applications (50%).

Intended learning outcomes

After finished course the student should be able to:

- apply basic theory and concepts of superconductivity
- analyze and evaluate superconducting applications
- apply basic concepts for other quantum fluids

Pedagogic development

The course was given as a new course during Autumn 2021 and is to a rather large extent based on the previous course SK2759 Superconductivity and its application, 6.0 credits. However, the new course also covers other types of quantum liquids and quantum gases. Besides adding these new parts to the course, the main pedagogic development has been to develop the examination in the course, which was both a consequence of the change in course content, the role of the course in the master's programme and the corona pandemic.

One INL1 part of the course was based on hand-in assignments in the form of essays – one essay about superconducting applications were a group assignment and the other essay was an individual one about a specific topic of other quantum liquids. This part was done as planned.

The TEN1 part of the course was originally planned to consist of quizzes in Canvas and a written exam. However, due to the pandemic situation, the written exam was replaced with hand-in group problems followed by an individual oral exam, where students were asked to explain the theory and the solution to problems related to specified grade.

Quantitative data

For the two examining parts of the course, the results are as follows:

INL1: 100% of the students have passed this part

TEN1: 50% of the students have passed this part

Course assessment

The students were asked to answer a short questionnaire after the course. 4 students out of 8 answered the questionnaire.

General conclusions

Students were quite satisfied with the course and 3 students out of 4 rated it as “Very good” and the last student as “Good”. Since this was the first time, the course was given in this format, it has worked very well although there are a few minor things that should be improved. The quite close group work required in the course, seems to have been clearly appreciated by the students.

Course material

The course material was highly praised by the students.

Examination

The examination method seems to have been very successful in the course. Having the oral exam on proofs from the book and on problems that the students had solved as group assignments during the course, seems to have stimulated social contact between the students. With 25 problems to solve for each group (among which some are quite demanding), they needed to work quite hard together. However, one potential problem was that it seems as the group dynamics in one of the two groups didn't work out as well as in the other group. That was seen on the result on the hand-in problems and the knowledge level when the students came the oral exam. In fact, the 4 students that passed the whole course all came from the same study group. In the other study group, I got the impression that the students who came to the oral exam were asking for a too high grade compare to their level of knowledge and, therefore, failed the oral exam.

Summary for next year's course

There are few minor things that need to be improved for the next year's course.

- Better information about the grade levels for the proofs in the written exam.
- Add some advice about how to work with the essay questions in INL1.
- Answers to teamwork problems should probably be provided afterwards.

- The course material on the new issues of quantum liquids and solids still needs to be somewhat improved.
- If continuing with group hand-in problems as preparation for an oral exam, there should probably be some limiting rules so that students that do not succeed so well with the group work, should be prevented for asking for a high grade in the oral exam. However, changing the official examination from a written exam to the format used this year, would probably be a good idea in the future, since it seems as the students have been very motivated for studying the course thanks to the rather intense group work.