Synkrotronljusfysik, Fysiska institutionen, Lunds universitet

Spektroskopi och materiens kvantmekaniska beskrivning, VT 2012

Reporting and presentation project

During weeks 4 to 12 you should work on understanding a chosen research subject, writing a report, and preparing an oral presentation.

Important dates

- 1st March, at lecture: Deadline for handing in the **first** version of your written report *and* presentation
- 9th March: Individual appointments for feedback on the report and presentation
- 15-20th March: Deadline for handing in the **final** version of your written report
- 15th March, 15.00 – 17.00, 20th march, 13.00 – 17.00: project presentations and "opposition"

"Opposition"

Each of you will play the role of an "opponent" on a project of one of the other students. This means that you also should study the other student's subject at least to a degree that you develop a basic grasp of the project (i.e., you should be able to formulate questions) and you should study the other student's report prior to the oral presentation. After the presentation you should lead a discussion on the other student's project, i.e., you should prepare questions on the subject. For example you might ask questions about things that you haven't understood, on things that are basic to the project and might enlighten the other course participants, or on things that you think your fellow student has presented in a wrong way. No slating, though, please.

Material

We will provide you with one or two references on your project. This should be regarded as a starting point for your literature search.

1. Inverse photoemission spectroscopy

- S. Hüfner: Photoelectron Spectroscopy, 3rd Edition, Springer, Berlin, 2003, chapter 9

2. Resonant methods within X-ray and photoelectron spectroscopy

- Jan-Erik Rubensson, J. Elec. Spec. and Rela. Phenom. 110–111 (2000) 135–151
- P. A. Brühwiler, O. Karis, and N. Mårtensson, Rev. Mod. Phys. 74 (2002) 703
- J. Schnadt, J. N. O'Shea, L. Patthey, L. Kjeldgaard, J. Åhlund, K. Nilson, S. Södergren, H. Hillesheimer, J. Schiessling, J. Krempasky, M. Shi, O. Karis, M.Bässler, H. Siegbahn, N. Mårtensson, and P. A. Brühwiler, Journal of Chemical Physics 119 (2003) 12462

4. Very high resolution photoelectron spectroscopy

- S. Hüfner: Photoelectron Spectroscopy, 3rd Edition, Springer, Berlin, 2003, chapter 1
- M. Quack and F. Merkt (eds): Handbook of High-Resolution Spectroscopy, John Wiley & Sons Ltd, Chichester, UK, 2011, p1655-1690

5. Extended x-ray absorption fine structure (EXAFS)

- J. Yano and V. K. Yachandra, Photosynth. Res. 102 (2009) 116

6. Femtosecond measurements of electron transfer processes using laser spectroscopy

- J. M. Hollas: Modern Spectroscopy, 4th Edition, John Wiley, Chichester, 2004
- M. J. Rosker, M. Dantus and A. H. Zewail, Journal of Chemical Physics 89(10) 6113-6127
- M. J. Rosker, M. Dantus and A. H. Zewail, Journal of Chemical Physics 89(10) 6128-6140

7. Reaction microscope and applications

- Ullrich J *et al,* Rep. Prog. Phys. **66** 1463 (2003)
- K. Ueda and J. H. D. Eland, J. Phys. B **38**, S839 (2005).
- M. Gisselbrecht *et al*, Phys. Rev. Lett, **96**, 153002 (2006)
- Schöfler *et al*, Science 320, 920 (2008)
- Jahnke *et al*, Nat. Phys. 6, 139, (2010).

8. Spectroscopy on C_{60} and other fullerenes

- P. Rudolf, M. S. Golden, and P. A. Brühwiler, Journal of Electron Spectroscopy and Related Phenomena **100** (1999) 409–433

9. Surface states

- S. Hüfner: Photoelectron Spectroscopy, 3rd Edition, Springer, Berlin, 2003, chapter 8

10. Surface core level shifts in photoelectron spectroscopy & density functional theory

- Groß, Theoretical Surface Science, Springer, Berlin, Heidelberg, 2002, chapter 2 & 3
- J. N. Andersen, D. Hennig, E. Lundgren, M. Methfessel, R. Nyholm, and M. Scheffler, Phys. Rev. B 50 (1994) 17525

11. Interpreting scanning tunnelling microscopy images

- W. A. Hofer, Prog. Surf. Sci. 71 (2003) 147.

12. Electron spectroscopy studies of graphene

- K. Geim and K. S. Novoselov, Nature Materials 6 (2007) 183
- Aaron Bostwick, Jessica McChesney, Taisuke Ohta, Eli Rotenberg, Thomas Seyller, and Karsten Horn, Prog. Surf. Sci. 84 (2009) 380

13. Semiconductor surfaces studies by PEEM and LEEM

- E. Hilner, PhD-thesis, Lund University, 2010 (papers VI and VII)

14. Hydrogen bonding studied by electron spectroscopies

- J. N. O'Shea, J. Schnadt, P. A. Brühwiler, H. Hillesheimer, N. Mårtensson, L. Patthey, J. Krempasky, C. K. Wang, Y. Luo, H. Ågren, J. Phys. Chem. B. **105**, 1917 (2001)
- J. N. O'Shea, Y. Luo, J. Schnadt, L. Patthey, H. Hillesheimer, J. Krempasky, D. Nordlund, M. Nagasano, P. A. Brühwiler, and N. Mårtensson, Surf. Sci. **486**, 157 (2001)
- G. Tu, Y. Tu, O. Vahtras, and H. Ågren, Chem. Phys. Lett. 468 (2008) 294

15. Adsorption of complex molecules on surfaces studied by electron spectroscopy

- L. Patthey, H. Rensmo, P. Persson, K. Westermark, L. Vayssieres, A. Stashans, Å. Petersson, P. A. Brühwiler, H. Siegbahn, S. Lunell, and N. Mårtensson, J. Chem. Phys. 110 (1999) 5913
- L. C. Mayor, J. B. Taylor, G. Magnano, A. Rienzo, C. Satterley, J. N. O'Shea, J. Schnadt, J. Chem. Phys. **129**, 114701 (2008)
- L. C. Mayor, A. Saywell, G. Magnano, C. J. Satterley, J. N. O'Shea, and J. Schnadt, J. Chem. Phys. **130**, 164704 (2009)

16. Quantum well states studied by photoelectron spectroscopy

- T.-E. Chiang, Surf. Sci. Rep. 39 (2000) 181
- D. A. Luh, Phys. Rev. Lett. 100 (2008) 027603

17. Spin states of heterocyclic compounds

- C. Isvoranu, B. Wang, K. Schulte, E. Ataman, J. Knudsen, J. N. Andersen, M.-L. Bocquet, and J. Schnadt, J. Phys.: Condens. Matter **22**, 472002 (2010
- C. Wäckerlin, D. Chylarecka, A. Kleibert, K. Müller, C. Iacovita, F. Nolting, T. A. Jung, and N. Ballav, Nature Commun. **1** (2010) 61