

Purpose of the corpes07 seminar

This theoretical seminar will focus on current difficulties with the interpretation of ARPES data and the proposed solutions to overcome these difficulties. We encourage all persons to register who are interested to contribute actively to this goal. As the composition of the organising committee indicates, we believe that progress in this field strongly depends on input from experimentalists. A typical day will have no more than two formal seminar talks, the rest of the time being reserved for work in small groups and discussions among people with complementary know-how.

Main topics are: Inclusion of correlation effects into one-step models, characterisation of the effect of electron-boson couplings on the selfenergy, low dimensional systems. Connection between ARPES and other (partially) momentum resolved experiments.

The binding energies of interest are near the Fermi edge, where secondaries play a minor role. For this reason, a lot of progress can probably be achieved in keeping within the sudden approximation, notably as concerns the photon energy- and polarisation- dependence of matrix elements that govern the transitions between ARPES initial and final states.

Contributions on photoemission theory beyond the limits of the sudden approximation are also encouraged: Resonant photoemission, regime of low photon energies, multi-photon processes.

Finally, the seminar will have an exploratory role in view of creating a CORPES forum, bringing together on a regular basis developers and users of software for ARPES data analysis on correlated systems. Contributions reporting on existing efforts in the direction of this goal are particularly solicited. Spectroscopy networks as well as synchrotrons are invited to send envoys. How to implement the CORPES forum will be the topic of a panel discussion during the workshop.

Subdivision of topics and preliminary time schedule

Few people are able to assist for more than a week, beyond the workshop. Therefore, we have made a division of the topics and attributed a preliminary time schedule. The plan is subject to changes, taking incoming proposals into account, and the time schedule can be somewhat adapted to the needs of participants.

1) April 10-20, ie. in the two weeks before the workshop, sessions on all aspects of the one-step theory for ARPES within the sudden approximation:

- Incorporation of correlations into the initial state
- Matrix elements, photon energy and polarisation dependence, escape length
- Final states, multiple scattering, inverse LEED formalism, connection to VLEED data

- Advantages and challenges of ARPES with soft X-rays

- Also: Explore pragmatic ways of breaking up the one-step formula into various modular units for data interpretation software

2) April 16-20, partly in parallel with 1), a series of sessions more focused on the correlations in the initial state:

- Momentum dependent extensions of DMFT
- Material specific theories (LDA+DMFT, orbital degeneracy, heavy fermion, etc....)
- Green functions for polaronic effects

3) April 16 - May 4, one week before and one week after the workshop, ie. having overlap with all other topics:

- Correlation effects in ARPES that have multiple interpretations (often claimed to be smoking guns for one's own interpretation).

Examples: Kink phenomena in the dispersion of peaks; competing groundstates; hidden order

- ARPES and other sources of (partly) momentum resolved information on correlations: STM, Raman,

4) April 30 - May 4: A week of photoemission theories beyond the sudden approximation

- Resonant photoemission (could also be placed in 1))
- Three current correlation function
- Keldysh Green function formalism
- Advantages and challenges near the zero kinetic energy limit.
- Multiple photons, FEL

5) April 30 - May 11, two weeks of ARPES on low dimensional systems:

- Surface states, vicinal surfaces
- ARPES from nano objects and aggregates
- Luttinger Liquid
- 1 dimensional deviations from the LL fixed point behaviour
- 2 dimensional extensions of LL
- Quantum criticality,... other low dimensional sources of non-FL behaviour,