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CFEL-bldg. 99, seminar room IV

Krzysztof Wohlfeld
University of Warsaw (Poland)

Resonant inelastic x-ray scattering: recent experiments, current theoretical understanding, and future challenges

Recently resonant inelastic x-ray scattering (RIXS) has positioned itself as one of the main spectroscopic techniques which is used to understand the complex states of matter. Hence, in the first part of the talk I will give a brief overview of the RIXS experiments which have contributed to such a huge success of RIXS. In particular, I will begin this part by discussing the first experimental observation of the orbiton — a collective excitation of a solid which carries solely an orbital quantum number — and the concomitant separation of the spin and orbital degrees of freedom in the quasi-one-dimensional copper oxides [1-2]. Next, I will discuss how RIXS has observed the collective magnetic excitations in the copper oxides and how this surprising finding could influence the theories of high-T_c superconductivity in these compounds [3-7]. Finally, a brief overview of the future pump-probe RIXS experiments will be given.

In the second part of the talk, I will discuss the theoretical description of RIXS and show what kind of approximations could be made in order to design a simplified, yet scientifically sound, description of RIXS [8]. I will end the talk by explaining what are the challenges that have to be overcome in order to achieve a viable description of the future pump-probe RIXS experiments.

REFERENCES

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