Graz Advanced School of Science

PHYSICS COLLOQUIUM OF THE UNIVERSITY OF GRAZ AND
THE GRAZ UNIVERSITY OF TECHNOLOGY

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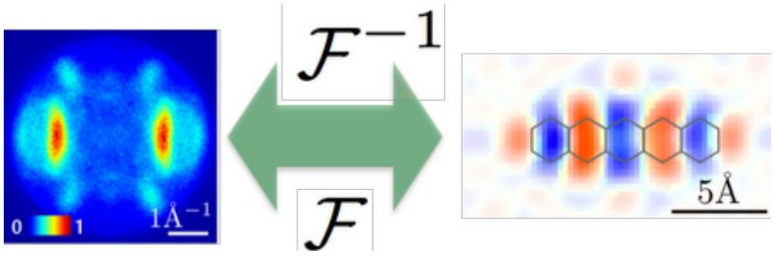
Coherence in time- and angle-resolved photoemission

Abstract:

Photoemission is fundamentally a coherent process. In most spectroscopic methods, however, the measured quantity is an intensity, i. e. the squared modulus of a complex amplitude. Some special techniques though are phase-sensitive and provide access to additional information. RABBITT is such a technique that enables the study of electronic dynamics on attosecond timescales based on and twophoton interferometry [1]. We extended RABBITT to condensed matter to study both electron transport as well as transient electric field distributions at metal and dielectric surfaces [2-4].

In the second part I will focus on effects on the angular distribution of photoelectrons. In photoelectron diffraction, the outgoing wave is elastically scattered at neighboring atoms. The coherent interference of direct and scattered waves leads to variation of the photoemission intensity. The technique is thus a sensitive structural probe and enables the elucidation of molecular adsorbate geometries [5]. In case of molecular valence levels, the initial state can be described as the coherent superposition of atomic wave functions. It was demonstrated that in certain cases, the photoelectron momentum distribution is related to the initial state wave function through a Fourier transform [6]. We have extended phase-retrieval schemes from optics to photoemission tomography to reconstruct molecular wavefunctions [7,8]. The technique can also be used for the complete determination of both electronic structure and adsorbate geometry as will be demonstrated for the case of a catalytically active macrocyclic molecule. Finally, I will give an outlook on our more recent endeavors towards time-resolved photoemission tomography.



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[6] P. Puschnig et al. Science, **326,** 702, (2009).
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Date:	Tuesday, May 28, 2019, 17:00
Location:	Lecture Hall 05.01, Institute of Physics, University of Graz, Universitaetsplatz 5
	16:30 meet the speaker tea, Library of Experimental Physics, Institute of Physics, Universitaetsplatz 5, 1st floor, room 122
Host:	Prof. P. Puschnig – Institute of Physics – Theory Division

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