

電子科学研究所学術講演会



講師: Prof. Martin Aeschlimann

(Department of Physics and Research Center OPTIMAS,
University of Kaiserslautern, Germany)

日時 : 平成 31 年 1 月 18 日(金) 16 : 00~17 : 00

場所 : 電子科学研究所 (北キャンパス総合研究棟
5号館) 1階会議室

タイトル: **Plasmonics at the Space-Time Limit**

The optical response of metallic nanostructures exhibits fascinating properties: Local field interference effects that lead to strong variations of the near field distribution on a subwavelength scale, and long lasting electronic coherences. To circumvent the limitation of optical diffraction we use a photoemission electron microscope (PEEM) that has been proved to be a versatile tool for the investigation of near field properties of nanostructures with nanometer spatial resolution and subfemtosecond time steps [1,2].

The potential of this technique will be demonstrated on two experiments: In a first work, the long-range energy transfer mechanism between two coupled plasmonic whispering gallery nanoantennas in an elliptical cavity has been investigated. We demonstrate periodic coherent energy transfer back and forth over a distance of twice the excitation wavelength [3]. In a second work we experimentally reveal and measure the spatiotemporal dynamics of the formation of plasmonic vortices and their dressing by optical angular momentum. We have manipulated one of the basic properties of light by converting spin angular momentum into orbital angular momentum in a plasmonic Archimedes spiral [4]. By analyzing the time-resolved data in the frequency domain, we show that both single and double angular momentum mixing processes are present, which correspond to different quantum pathways of the electron excitation in 2-photon-photoemission.

[1] M. Aeschlimann *et al*, *Nature* **446**, 301 (2007)

[2] M. Aeschlimann *et al*, *Science* **333**, 1723 (2011)

[3] M. Aeschlimann *et al*, *Light: Science & Applications* **6**, e17111. (2017)

[4] G. Spektor *et al*, *Science* **355**, 1187 (2017)

主催 : 北海道大学電子科学研究所学術交流委員会

共催 : 応用物理学会北海道支部

連絡先: 電子科学研究所
グリーンフォトニクス研究分野
三澤 弘明、上野 貢生、孫 泉
TEL: 011-706-9318