量子科学研究センターセミナーのご案内　4 月 21 日（月）

Qi-Fan Yang 先生（北京大学)、Stephan Amann 氏（Max Born Institute for Nonlinear Optics and Short Pulse Spectroscopy)、小澤陽先生（前所属：Max-Planck-Institut fuer Quantenoptik, 現所属：横浜国立大学）が、横浜開催の国際会議 ALPS2025/OPIC2025 国際会議に参加される機会に、本学を訪問されます。
Qi-Fan Yang 先生はマイクロコムの開発、Stephan Amann 氏は光周波数コムによる 3 次元計測技術の開発、小澤陽先生は極紫外線領域の光周波数コムの開発と応用をご専門とされています。本セミナーでは最新の研究成果をご紹介いただきます。
研究室の研究員、学生の皆様もお誘いあわせのうえ、奮ってご参加ください。

日時：2025 年 4 月 21 日（月）16:15～
場所：東 6 号館 337 室
主催：量子科学研究センター http://www.ias.uec.ac.jp/

1. Prof. Qi-Fan Yang (Peking University)
   Title:
   Integrated microcombs for microwave synthesis
   Abstract:
   Low-noise microwave signals with exceptional time stability are critical for applications ranging from wireless communications to high-precision metrology. Today, the purest microwaves are produced via optical frequency division (OFD), a process in which an ultrastable optical reference and a high-quality optical frequency comb convert an optical frequency into the microwave domain. However, most OFD systems depend on large, vacuum-enclosed optical resonators and table-top frequency combs, restricting their use to specialized laboratory environments. Recent efforts to miniaturize these components have focused on microresonators for laser stabilization and microcombs for frequency comb generation. In this talk, I will present our latest progress in developing high-performance microcombs and optical references, which form the foundation for compact OFD systems suitable for real-world applications.
   Short bio:
   Qi-Fan Yang earned his Bachelor's degree in Physics from Peking University and his Ph.D. in Applied Physics from the California Institute of Technology. He is currently an Assistant Professor at Peking University. His research interests span integrated photonics and precision metrology, with a particular emphasis on microcomb technology. He has published over 40 research articles in journals including Science, Nature, Nature Photonics, and Physical Review Letters.

2. Mr. Stephan Amann (Max Born Institute for Nonlinear Optics and Short Pulse Spectroscopy)
   Title
   Three-Dimensional Imaging using Optical Frequency Combs
   Abstract:
   Frequency combs are broad optical spectra consisting of equidistant, narrow and phase-coherent laser lines. In this talk, I will present a new application of optical frequency combs for lensless three-dimensional imaging. The unique properties of frequency combs, such as their wide spectral bandwidth and long temporal coherence, are combined with the multiheterodyne readout of the utilized interferometric

techniques. I will show how dual-comb interferometry can be implemented for scan-free holographic measurements using camera sensors. Furthermore, microcombs open up new possibilities for hyperspectral 3D imaging and for the characterization of wavefronts with steep variations, such as those found in macroscopic objects with step features of micrometer or millimeter dimension.

Short bio:

Stephan Amann is a Doctoral Candidate at the Max Born Institute for Nonlinear Optics and Short Pulse Spectroscopy in Berlin, Germany. His research is focused on the use of optical frequency combs for three-dimensional imaging. After completing a Master in Physics at the Technical University of Darmstadt, he joined the group of Nathalie Picqué for his doctoral research, first at the Max Planck Institute of Quantum Optics, and since 2024 at Max Born Institute in Berlin.

3. Prof. Akira Ozawa (Yokohama National University, previously: Max-Planck-Institut fuer Quantenoptik)

Title:

Extreme ultraviolet optical frequency combs and applications

Abstract:

The extreme ultraviolet (XUV) frequency comb is an indispensable tool for extending optical frequency metrology into the unexplored wavelength range below 200 nm. With XUV frequency combs, precision spectroscopy for fundamental physics, optical clocks and laser cooling can be extended into the XUV regime for the first time. In this talk, I will present the laser system for optical frequency comb generation at extreme ultraviolet (XUV) wavelengths below 200 nm, which is designed for precision spectroscopy of the 1S-2S two-photon transition in He+. The spectroscopy is expected to serve as a precise test of fundamental theories such as bound-state quantum electrodynamics (QED). Our recent efforts to realize XUV frequency metrology using a miniaturized compact setup based on XUV waveguides on microchip will also be discussed.

Short bio:

Akira Ozawa graduated from the Department of Physics at the University of Tokyo and earned his Ph.D. in Physics from Ludwig-Maximilians-Universität Munich in 2009. He is currently an associate professor at Yokohama National University and a guest researcher at the Max Planck Institute of Quantum Optics. His research interests include XUV frequency comb generation via high-order harmonic generation (HHG) and precision spectroscopy of trapped ions.

問い合わせ先：
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