=== 量子科学研究センターセミナーのご案内 ===

中国・清華大学（Tsinghua University, China）の Guanhao Wu 先生および Kai Ni 先生が、横浜開催の国際会議 ALPS2023（The 12th Advanced Lasers and Photon Sources）に参加される機会に、本学を訪問されます。

つきましては下記の要領で、量子科学研究センター主催の研究セミナーを開催いたします。
両先生とも本学教員と長年の親交があり、JSPS の 2 国間共同研究を行うなど、本学にもたびたび来訪されています。レーザーを用いた光計測がご専門で、近年は特に光周波数コムによる精密計測に関する研究を精力的に進められています。本セミナーでは先生方の最先端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：2023 年 4 月 17 日（月）16:15 – 17:45
場所：東 6 号館 803 室
主催：量子科学研究センター

[Talk 1]
Title: Dimensional measurement using optical frequency combs

Speaker: Prof. Guanhao Wu (Tsinghua University)

Abstract: Dimensional measurement is essential to ensure the precision and quality of manufacturing or assembly in various fields such as aerospace, semiconductors, and precision instruments. Traditional dimensional measurement mainly relies on interferometric methods, which is an incremental measurement method with many limitations in practical applications. The invention of the optical frequency comb has brought new breakthroughs to dimensional measurements, as it can conveniently achieve direct absolute measurements. Moreover, in terms of measurement accuracy, it can achieve measurement traceability to the frequency standard, which has a higher accuracy compared to the traditional wavelength reference. In this talk, I will first introduce the progress my group has made in dual-comb distance measurements and demonstrate its applications. Next, we will introduce dual-comb based multi-degree-of-freedom measurements over a large unambiguity range. Finally, I will introduce the progress in surface profile measurements using frequency combs.

[Talk 2]
Title: Digital error correction method for dual-comb system

Speaker: Prof. Kai Ni (Tsinghua University)

Abstract: Dual-comb spectroscopy (DCS) is a new type of high-performance spectrum measurement technology. It can use a single-pixel photodetector to achieve fast and broadband spectroscopic detection without mechanical scanning part, which has become a cutting-edge technology in precision spectroscopy field. However, DCS puts forward strict requirements on the mutual interference of the two frequency combs. In order to suppress the frequency drift caused by environmental disturbance, the existing dual-comb system with high performance generally needs to be equipped with high-speed closed-loop feedback electronics. The limited robustness, control bandwidth and long-term stability make it difficult to adapt for the field-deployed applications. To solve the above-mentioned problems, we studied the noise model of DCS and proposed several digital error correction methods for DCS to achieve high performance, low complexity and high long-term stability, which provides a feasible scheme for the dual-comb system from laboratory to the field-deployed applications.

お問合せ：量子科学研究センター/基盤理工学専攻　美濃島 薫 k.minoshima@uec.ac.jp
