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## “Nonlinear optics in multipass cells”

# Professor Oleg Pronin

Helmut Schmidt University, Hamburg, Germany

日時: 2023年12月7日(木) 14:00~15:00

場所: 理学部1号館3階340号室+ZOOMでの開催(事前登録制)

### 【Abstract】

Reliable industrial femtosecond lasers are based on a Yb-doped laser gain medium with an output pulse duration from 200 to 1000 fs. These output pulses can be further broadened and compressed to the range of 7-100 fs, depending on the application. In this talk, I report on the compression method involving new technology, free-space multipass cells. Moreover, the application of the multipass cells is not limited only to spectral broadening and compression. The multipass cells are a foundation of  $\chi(3)$  multipass nonlinear optics [1,2], a small emerging sub-field of nonlinear optics. This talk will address the recent developments in this field, including further peak and average power scalability towards sub-Joule energies and kW-level average power and pulse compression from 250 fs down to 7 fs.

Additionally, I will describe our very recent development on  $\chi(2)$  multipass nonlinear optics [3]. Here, I will report on a new approach to the quasi-phase matching of nonlinear materials based on the free space multipass cells. The method applies to all nonlinear crystals with non-zero susceptibility  $\chi(2)$ , and can, for example, phase match such materials as crystalline quartz.

[1] M. Hanna et al., Laser & Photonics Reviews, 15, 2100220 (2021) [2] S. Goncharov et al., Opt. Lett. 48,147–150 (2023) [3] N. Kovalenko et al., arXiv.2209.06207.

### 【Biography】

Oleg Pronin was born in Ertil, Russia, in 1985. He received a Diploma degree in solid-state physics from Moscow Engineering Physics Institute in 2008, and a Ph.D. degree in physics from the Ludwig Maximilian University of Munich, Germany, in 2012.

From 2012 to 2014, he was a Postdoctoral Scientist at the Ludwig Maximilian University of Munich. From 2014 to 2019, he was a Group Leader with Prof. Dr. Ferenc Krausz at the Max Planck Institute of Quantum Optics, Garching, Germany. Since 2019, he is a full professor at Helmut Schmidt University in Hamburg, Germany. He co-authored over 30 articles and holds several patents. He is a co-founder of n2-Photonics.

使用言語 : 英語 (English)

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申込方法 : Google forms(下記)にて参加の申し込みを行ってください。

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