



**24<sup>th</sup> May 2017 - 2:00 p.m.**  
CFEL-bldg. 99, seminar room IV

Alexei N. Grum-Grzhimailo

Skobeltsyn Institute of Nuclear Physics, Lomonosov Moscow State University, Moscow, Russia

## Asymmetries in electron emission produced by intense linearly and circularly polarized XUV radiation

Violation of certain symmetries often gives evidence to more complicated dynamics of the process than it is usually implied. The talk concentrates on a few examples of such violation in the photoelectron angular distribution (PAD) generated by intense XUV radiation. The first example is a forward-backward asymmetry in the PAD in ionization of positively charged ions. Such an asymmetry is caused by the contribution of higher multipoles of the electromagnetic field. This effect has been extensively studied in ionization of neutral atoms and molecules by third generation synchrotron radiation sources. With the advent of FELs it is now possible to observe the forward-backward asymmetry in ionization of positively charged ions. The first results on the argon ion show the feasibility of such studies.

The second example is the PAD generated by bichromatic field with two multiple frequencies. In particular, the PADs are modified already when the radiation includes the fundamental ( $\omega$ ) and its second harmonic ( $2\omega$ ): the symmetry is violated due to the interference between the amplitudes of the two possible ionization pathways, by the single  $2\omega$ -photon of the second harmonic and by the two  $\omega$ -photons of the fundamental. It has been observed in the XUV only recently at FERMI. For linearly and circularly polarized bichromatic fields the effect is different. Coherent control of the PADs will be discussed. The asymmetries show resonance profiles as functions of the photon energy when passing through a resonance. Examples of the asymmetries in the PAD will be presented for hydrogen, neon, argon.

