

SEMINARIUM RENTGENOWSKIE

W dniach 29 i 30 października 2015r. o godz. 10.30, w sali D Instytutu Fizyki PAN, odbędą się seminaria rtg., na których dr Wojciech Gawelda z European XFEL (Hamburg, Germany) wygłosi referat w dwóch częściach na temat:

„State-of-the-art in time-resolved X-ray spectroscopies at synchrotrons and XFELs“

Abstract:

X-ray spectroscopic tools, such as EXAFS and XANES, allow measuring local geometric and electronic structure of molecular systems, even in disordered media. X-ray Emission Spectroscopy (XES) delivers direct information about the electronic spin state. Implementing these tools in ultrafast experiments at modern synchrotrons permits to study dynamics of photochemical reactions with temporal resolution down to 100 ps.

In the first presentation, I will present the state-of-the-art in pump-probe XAS/XES techniques used at 3rd generation storage rings. It will be shown how picosecond-resolved XANES and EXAFS can be used to monitor geometrical structure changes of the molecule during a light-induced chemical reaction, i.e. light-induced spin crossover. Furthermore, recent experiments exploiting picosecond non-resonant and resonant XES of the K_{α} emission established a direct measurement of the short-lived high-spin states in numerous solvated transition metal complexes.

In the second presentation, I will discuss the present status of how time-resolved XAS/XES techniques can be efficiently used at hard X-ray Free Electron Lasers (XFELs). The extension of these spectroscopic techniques using ultrashort X-ray pulses derived from XFELs is rather straightforward, but requires to adapt to specific measurements conditions imposed by the SASE XFEL beam characteristics. I will show examples of studies on solvated transition metal complexes to illustrate how the femtosecond XAS/XES measurements deliver a complete dynamical description of the interplay between nuclear, electronic and spin degrees of freedom occurring during a chemical reaction.

Present status of the experiments will be discussed as well as a comparison to pump-probe techniques used at synchrotrons so far. An outlook towards the commissioning and scientific case for the scientific instrument Femtosecond X-ray Experiments (FXE) at the European XFEL will be presented as well.

Prof. dr hab. Krystyna Jabłońska