

ÚSTAVNÍ SEMINÁŘ

ve středu dne **19. března 2014** v **15:00** hod.
v přednáškovém sále Fyzikálního ústavu
v Cukrovarnické

Program:

Oleg Lunov

Advanced Physical Methods in Cell Biology and Nanomedicine

Physics has made crucial assistance to health ever since the birth of medicine. Vast variety of modern advanced physical methods has been developed for biological and medical applications in the last decade, such as applications of optoelectronics in medicine, biophotonics, biomedical applications of low temperature plasma, spectroscopy, laser technology, nanotechnology. As a part of novel physical methods, superparamagnetic iron oxide nanoparticles are widely used for cell labeling and as diagnostic contrast media. We investigated how these nanosized particles might affect cellular functions. First of all, we revealed that the main uptake mechanism proceeds via clathrin-dependent, scavenger receptor-mediated endocytosis. A mathematical model of the uptake process was created that permits determination of key parameters of endocytosis. Furthermore, we investigated delayed effects of nanoparticles on living cells. Prolonged exposure of the macrophages to nanoparticles led to significantly enhanced production of reactive oxygen species associated with induction of apoptosis (programed cell death). These data indicate that nanosized contrast media hamper macrophage function, an effect that can be antagonized with suitable oxygen radical scavengers. Furthermore, contributions of physics in biomedicine will grow as the molecular mechanisms of disease are better understood and as new technologies enable the investigation of these molecular processes in vivo. Generally, a better understanding of the underlying biological mechanisms of novel physical methods will be instrumental for the development of new diagnostic and therapeutic strategies.

Oleg Lunov graduated with MSc degree in Biophysics from Donetsk National University, Ukraine in 2007. He obtained his PhD from the Institute of Pharmacology, Ulm University, Germany in 2011. Following this, he worked as a post-doctoral researcher at the same institute. In 2014 he received the Purkyne Fellowship and joined Institute of Physics AS CR.

Seminář bude přednesen v anglickém jazyce.

doc. Jan Řídký, DrSc.
ředitel