

Advanced Analysis in Nanospace: Research with the XFEL

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Abstract

Little happens in industrialised countries without the use of high-tech materials which are the building blocks of all modern technologies ranging from information, communication, health, energy and environment to transport. In the last decades the development of novel materials has progressed at a breathtaking rate. This has become possible through our microscopic insight into the atomistic structure of condensed matter which finally enabled us to assemble new material systems atom-by-atom. These days, we are facing a revolution in the investigation of nanospace: Through new concepts in accelerator physics, electrons can be forced to emit short-pulsed x-ray laser radiation. Such a futuristic European x-ray free electron laser (XFEL) laboratory is currently being constructed and will allow mankind to finally get holographic snapshots of the motion of atoms and electrons in materials. Ultimate insights into matter, as the realtime-observation of the formation and the breaking of molecular bonds, sound like science fiction, but could become reality in less than a decade, if Europe embarks today into this bold adventure which will lead us into unexplored dimensions of nanospace.

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