Advanced Analysis in Nanospace: Synchrotron Radiation, Quo Vadis ?

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In the next years, accelerator-based x-ray research will be entering an interesting and challenging new period which requires –in order to become successful- a high coherence not only in the x-ray beam, but in particular in the x-ray community. I will focus onto two developments which I consider of key importance:

1. Our existing modern Synchrotron radiation (and neutron) facilities in Europe have reached a very high level of sophistication, but also of maturity and reliability. They are ready now to offer their analytical potential to applied science and to industrial users. It is thus mandatory that the European Synchrotron radiation (and neutron) facilities clearly define their role for the development of new materials and new technologies in Europe. In a current joint European effort between the materials science laboratories, the industry and the large scale facilities, the potential of modern Synchrotron radiation and neutron probes for overcoming key barriers in the development of novel materials and devices for new technologies is explored in a systematic way

2. Through new concepts in superconducting accelerator physics and new developments in photo cathodes, well-defined ultra-relativistic electron bunches can be forced to emit short-pulsed coherent x-ray laser radiation. Such futuristic x-ray free electron lasers will allow mankind to finally get holographic snapshots of atoms and electrons in materials. Ultimate insights into matter, as the realtime-observation of the formation and the breaking of molecular bonds, may sound like science fiction, but could become reality in less than a decade, if today Europe embarks jointly into this bold adventure, called European XFEL laboratory, which will lead us into unexplored dimensions of nanospace.