

Studying matter under extreme temperature, pressure or field conditions using intense, ultrafast x-ray pulses

Abstract:

The European XFEL will starting 2016 provide highly intense, coherent and ultrashort x-ray pulses allowing to study matter in extreme conditions. The radiation properties of European are matching well the conditions applying to this type of systems. Typically states live only for very short duration and intense and ultrashort pulses are needed for the investigation. In addition the density can be very high and hard x-rays are needed to study volume properties. Also the short wavelength of hard x-rays is needed to unravel structural properties at the atomic level. Applications of this type of research are relevant for a large class of problems reaching from structural properties of complex, magnetic solids, through the properties of matter under conditions resembling that of planetary interiors, to the discovery of new materials with properties not existing under ambient conditions. The talk gives an outlook on science problems to be addressed with this new instrument.