

September 14<sup>th</sup>, 2010, 10.00 a.m. – DESY Bldg. 49, Room 108

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### Ultrafast dynamics within complex systems stimulated by intense free-electron laser radiation

Ultrashort, intense pulses from free-electron lasers (FELs) enable the investigation of static and dynamic states of matter. A goal of research with FELs is to explore ultrasmall spatial scales: the structure of objects at atomic resolutions, and ultrashort temporal scales: transitions occurring at timescales down to femtoseconds.

In order to achieve this we need a comprehensive theoretical understanding of the states and transitions that may be investigated with FEL radiation. Simulation tools must be developed that follow the non-equilibrium evolution of irradiated complex systems. We discuss the existing methodology and tools, with emphasis on the kinetic equation approach, and give an outlook for the future.

