

GFA and SwissFEL Accelerator Seminar

The Development of Relativistic Ultrafast Electron Diffraction: Using Particle Accelerators to Watch Atoms Move in Real Time

Monday, 11 July 2011, 16.00 h, WBGB/019

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In this talk, I'll present the development of a novel technique based on the use of high brightness relativistic beams from RF photoinjectors to study ultrafast structural dynamics with sub-100 fs temporal resolution. Using electron beams of relativistic energies to minimize the space charge induced pulse lengthening, it is possible to obtain sub-100 fs bunches containing more than 10 millions electrons. These beams are intense enough to capture in a single diffraction pattern the structural information of a sample, allowing an unprecedented time resolution and enabling the study of irreversible ultrafast phenomena with single shot diffraction patterns. I'll discuss the advances in accelerator technology and beam physics that made possible this technique, the first experiments carried out at the UCLA Pegasus Laboratory, and the future science possibilities opened by the unique characteristics of this novel source.

