



12th April 2013 - 14:00
CFEL-bldg. 99, seminar rooms I, II, III

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Extreme light: laser ascent to subatomic physics

Fundamental High Energy Physics has been mainly driven by the high-energy fermionic colliding beam paradigm. Today the possibility to amplify laser to extreme energy and peak power offers, in addition to possibly more compact and cheaper ways to help HEP, a complementary new alternative underpinned by single shot, large field laser pulse, that together we could call (Laser-based) High Field Fundamental Physics. The main mission of the International center on Zetta-Exawatt Science and Technology (IZEST) is to muster the scientific community behind this new concept. As an example, we project to use the laser field to probe the nonlinearity of vacuum. We envision that seeking the non-collider paradigm without large luminosity substantially shorten our time-line. We further accelerate the time-line of the research by adopting the existing large energy laser LIL. The accelerated research on the non-collider paradigm in TeV and beyond could, however, stimulate innovation in collider thinking such as lower luminosity paths, novel radiation cooling, and gamma-gamma colliders. The advancement of intense short-pulsed laser energy by 2-3 orders of magnitude empowers us a tremendous potential of unprecedented discoveries. These include: TeV physics, physics beyond TeV, new light-mass weak-coupling field discovery potential, nonlinear QED and QCD fields, radiation physics in the vicinity of the Schwinger field, and zeptosecond dynamical spectroscopy of vacuum.

On the application side, we will describe the program ICAN (International Coherent Amplification Network) dedicated to the generation of ultra high intensity, high average power and efficiency based on a fiber-based revolutionary laser infrastructure. We see ICAN as the laser response to grand scientific and societal challenges like particle collider, nuclear transmutation, proton therapy.

Host: Franz X. K rtner, CFEL-UX