Generation of Femtosecond X-Ray Pulses and Other Laser-Electron Beam Experiments at DELTA, S. KHAN, BESSY-II, Berlin; W. SANDNER, I. WILL, MAX-BORN-INST., Berlin; N. MARQUARDT, Inst. for Accelerator Physics and Synchrotron Radiation, Univ. of Dortmund, Germany - A novel technique for generating sub-picosecond x-ray pulses, proposed by A.A. Zholents and M.S. Zolotorev [1] and currently tested at the ALS/Berkeley, is planned to be applied also at the Dortmund Electron Test Accelerator DELTA. It is based on the interaction of the e- beam with a copropagating fs-laser pulse in the superconducting DELTA wiggler of K(max) = 37. Due to the high electric laser field, a short bunch slice is produced with an energy modulation, which is sufficiently large for transverse separation of these electrons from the rest of the bunch by magnetic dispersion. Using the subsequent U-55 undulator of 49 periods, 5.5 cm period length and K(max) = 3.5 as radiator (to be installed at DELTA this year), short, energetically tunable x-ray pulses of sufficient intensity will be produced. By simulations it has been estimated that pulses with a brilliance of 10^7 - 10^8 photons/(s mm^2 $mrad^2$ 0.1%b.w.) and 350 fs FWHM can be obtained, improving the temporal resolution of the beam by two orders of magnitude. Additionally, other laser-e- beam experiments, like beam diagnostics with lasers, generation of gamma-rays for nuclear-astrophysics applications etc., are planned at DELTA, together with intra-cavity Compton backscattering of the DELTA free-electron-laser beam.

[1] Phys. Rev. Lett. Vol.76, No.6 (1996) 912.