

## **Femtosecond Electron Beam Generation by the S-band Laser-Photocathode RF Gun and Linac,**

H. HARANO, K. KINOSHITA, T. UEDA, M. UESAKA, T. WATANABE, K. YOSHII, Univ. of Tokyo; K. NAKAJIMA, H. NAKANISHI, A. OGATA, KEK; H. DEWA, S. KONDO, H. KOTAKI, F. SAKAI, JAERI; M. KANDO, Kyoto Univ; A. ENDO, M. WASHIO, Sumitomo Heavy Industries - Laser-Photocathode RF gun was installed in the S-band linac of Nuclear Engineering Research Laboratory, University of Tokyo, for laser wakefield acceleration and femtosecond X-ray generation. 10 ps (FWHM), 4.5 MeV electron beam with low emittance of a few pmmÅEmrad from the gun was accelerated to 20 MeV and compressed by the chicane to 0.4-1 ps (FWHM). Electron bunch shape was measured by the femtosecond streak camera by single shot. Coherent transition radiation interferometry is going to be used for the diagnostics. We discuss the comparison of numerical and measured results of the pulse width of the compressed beam. The effect of noninertial space charge force and coherent synchrotron radiation force on the bunch shape in the chicane is numerically evaluated. The femtosecond electron beam collides with 80 fs, 2.5 TW laser and femtosecond X-ray pulse is produced via Thomson backscattering. The femtosecond X-ray pulse is measured by the subpicosecond X-ray strak camera. This femtosecond linac-laser system is also planned to be applied to subpicosecond pulseradiolysis experiments for radiation chemistry.