

Pre-bunched Electron Beam Generation and Application for Accelerator-based THz radiation Source

*A.Aryshev^{a,1}, D.Yu.Sergeeva^{b,c}, L.G.Sukhikh^d, A.A.Tishchenko^{b,c},
N.Terunuma^a, J.Urakawa^a*

^a KEK: High Energy Accelerator Research Organization, Tsukuba, Japan

^b National Research Nuclear University (MEPhI), Moscow, Russia

^c National Research Center "Kurchatov Institute", Moscow, Russia

^d Tomsk Polytechnic University, Tomsk, Russia

The motivation for developing of intense THz source at KEK LUCX is coming from the growing interest to THz radiation from various scientific communities worldwide. High gradient photo-cathode RF gun and few tens of femtosecond (Ti:Sa) laser system are now routinely used to generate a pre-bunched electron beam of a few hundred femtoseconds. Also, a new Yb-doped fiber based laser system with enhanced tunability and stability is under development. We are investigating the production and properties of the intense radiation beams in the range of 0.1-0.6 THz based on Grating Diffraction Radiation (GDR) and Smith-Purcell radiation. These types of EM radiation are generated when a charged particle moves in the vicinity of a periodical pattern or grating. The grating type and period can be chosen to make quasi-monochromatic radiation spectrum. In this reports the status of the KEK LUCX facility and its RF gun laser system upgrade will be presented. Also, consequent enhancements to radiation studies will be discussed.

This work was supported by the JSPS and RFBR under the Japan-Russia Research Cooperative Program (18-52-50002 YaF_a), the Competitiveness enhancement program of Tomsk Polytechnic University and the Competitiveness Programme of National Research Nuclear University "MEPhI".

¹ Corresponding author: alar@post.kek.jp