GENERATION OF THZ SMITH-PURCELL RADIATION ON FEMTOSECOND ELECTRON BEAM

Konstantin Lekomtsev[1]***, Alexander Aryshev, Mikhail Shevelev, Nobuhiro Terunuma, Junji Urakawa***

High Energy Accelerator Research Organization (KEK), Tsukuba, Japan

Development of compact, tunable, and high power THz radiation sources is an important task in the field of THz science [1]. Short, hundreds of femtoseconds duration electron bunches may produce coherent THz radiation, by means of Smith-Purcell radiation (SPR) in super – radiant regime [2], occuring when a micro-bunched electron beam travels in the vicinity of a periodic target.

LUCX accelerator at High Energy Accelerator Research Organisation (KEK) produces short, hundreds of femtoseconds duration electron micro-bunches with variable repetition frequency, allowing to generate tunable SPR. Echelle profile gratings were designed to generate 500, 750 and 1000 GHz radiation at the first diffraction order. In this status report we will present simulations of spectral response of the gratings as well as angular distributions of SPR using Computer Simulation Technology Particle Studio software. Checks of manufacturing accuracy using laser scanning microscope and dependencies of the radiation yield on the beam impact parameter will be shown. Angular dependencies of SPR will also be discussed.

References

[1] D.M.Mittleman, Nature Photonics **7**, 666 (2013)
[2] S.E.Korbly et al., PRL **94**, 054803 (2005)

[1] Corresponding author: konstlek@post.kek.jp