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Study of Cherenkov diffraction radiation from radiator with periodic structure in THz-region

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We have studied classical radiation from relativistic electrons at a facility, test accelerator as a coherent terahertz source (t-ACTS), the Research Center for Accelerator and Radioisotope Science (RARiS), Tohoku University. Cherenkov radiation is generated when a relativistic charged particle passes through a dielectric medium, while Cherenkov diffraction radiation (ChDR) is emitted when the relativistic charged particle passes near the dielectric medium. In general, the ChDR spectrum is broadband. However, when a periodic structure is used as a radiator, interference effects can monochromatize the ChDR. At t-ACTS, a proof-of-principle experiment in the THz region was conducted using a high-density polyethylene (HDPE) radiator with a periodic structure. We successfully measured ChDR from radiator with periodic structure and achieved narrowband ChDR (NbChDR) in the THz region. This paper will discuss the characteristics of NbChDR in the THz region, as observed at t-ACTS.

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Author: NANBU, Ken-ichi (Tohoku University)

Co-authors: HINODE, Fujio (Tohoku University); HAMA, Hiroyuki (Tohoku University); NAGASAWA, Ikurou (Tohoku University); TAKAHASHI, Ken (Tohoku University); SHIBATA, Kotaro (Tohoku University); KITISRI, Pitchayapak (Tohoku University); KASHIWAGI, Shigeru (Research Center for Accelerator and Radioisotope Science); MUTO, Toshiya (Tohoku University); KUDO, Kodai (Tohoku University); KAVAR, Anjali (Tohoku University); YAMADA, Hiroki (Tohoku University)

Presenter: NANBU, Ken-ichi (Tohoku University)

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