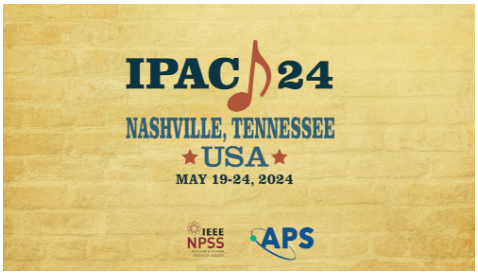

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Dielectric wakefield accelerators: tuning THz radiation via coherent Cerenkov radiation for biomedical applications

Tuesday, 21 May 2024 16:00 (2 hours)

The THz spectrum reveals distinctive vibrational and rotational modes, and when charged particle beams produce THz radiation, it becomes a promising source for generating narrowband, high-energy radiation. Particularly in dielectric wakefield accelerators, where a dielectric-lined channel is traversed by a relativistic electron beam, coherent Cerenkov radiation (CCR) is generated. The frequency and amplitude of CCR are dependent on structural geometry and drive beam parameters. Simulating a μm, pC driver beam in a dielectric wakefield structure yields longitudinal fields of MV/m, with a fundamental mode associated with a resonant peak corresponding to the process of demethylation in DNA. Achieving higher frequencies requires a thin dielectric layer or Bragg-like boundaries in the structure to constructively reinforce the fundamental frequency.

Footnotes

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