



Contribution ID: 1180 Contribution code: TUPL120

Type: **Poster Presentation**

## Noise in intense electron bunches

*Tuesday, 9 May 2023 16:30 (2 hours)*

Noise and density fluctuations in relativistic electron bunches, accelerated in a linac, are of critical importance to various Coherent Electron Cooling (CEC) concepts as well as to free-electron lasers (FELs). For CEC, the beam noise results in additional diffusion that counteracts cooling. In SASE FELs, a microbunching instability starts from the initial noise in the beam and eventually leads to the degradation of beam energy spread and emittance in the linac. It can also produce nonuniform longitudinal phase-space for seeded FELs and hence affect the seeding efficiency. The development of robust beam-noise diagnostics for the near, mid and far-infrared regimes is essential for mitigating these risks. Here we describe an ongoing experimental program at the Fermilab Accelerator Science and Technology (FAST) facility to measure the level of density fluctuations in intense electron beams using transition radiation. In the initial experiments, we focus on the 0.5 –2.5  $\mu\text{m}$  length scale, which is relevant to CEC concepts.

### Funding Agency

### Footnotes

### I have read and accept the Privacy Policy Statement

Yes

**Primary author:** NAGAITSEV, Sergei (Fermi National Accelerator Laboratory)

**Co-authors:** LUMPKIN, Alex (Argonne National Laboratory); SAEWERT, Andrea (Fermi National Accelerator Laboratory); STUPAKOV, Gennady (SLAC National Accelerator Laboratory); RUAN, Jinhao (Fermi National Accelerator Laboratory); JARVIS, Jonathan (Fermi National Accelerator Laboratory); THURMAN-KEUP, Randy (Fermi National Accelerator Laboratory); KIM, Young-Kee (University of Chicago); HUANG, Zhirong (SLAC National Accelerator Laboratory)

**Presenter:** NAGAITSEV, Sergei (Fermi National Accelerator Laboratory)

**Session Classification:** Tuesday Poster Session

**Track Classification:** MC2: Photon Sources and Electron Accelerators: MC2.A08: Linear Accelerators