8th MT Student Retreat



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Radiative particle-in-cell simulations of the beam hosing instability

Wednesday 28 September 2022 10:00 (15 minutes)

We present the results and analyses of radiation spectra expected to be produced by highly relativistic particle beams propagating through a plasma medium and experiencing the hosing instability. Coherent and incoherent contributions to the spectra are determined in-situ for all simulated particles (>10^9) of the particle cloud and ambient plasma for a lage assembly of detectors. With the help of our particle-in-cell code we are able to distinguish radiation emitted by plasma particles from that of the bunch. In the simulation campaign, conducted at the JUWELS Booster cluster at JSC, we consider linear and non-linear regimes of the instability for highly relativistic electron beams impacting a homogeneous electron plasma. We show an updated analysis of the data relating observed characteristics of the spectra to the features of the bunch and ambient plasma, thereby identifying first features indicative of the hosing instability in PWFA. A goal of these studies is to open up new experimental avenues for

better understanding the beam instability evolution by identifying quantitative radiation signatures of the instability that can be measured in experiments.

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