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Simulating effects of beam hosing and ion collapse on betatron radiation efficiency for experiments at FACET II[1] MONIKA YADAV[2], University of California Los Angeles, ARAVINDA PERERA, University of Liverpool, CARSTEN WELSCH, University of Liverpool/cockcroft institute, JAMES ROSENZWEIG, University of california los angeles — Generation of betatron radiation is one of the 10 experiments which are proposed at the Facility for Advanced Accelerator Experimental Tests (FACET) II. However, previous works have not considered the effects of ion motion and hosing instability on the radiation spectrum, which may arise due to strongly non-linear wakefields driven by high current beams. We present numerical studies using 3D PIC simulation codes for beams undergoing hosing, seeded by long- and short-wavelength head-to-tail centroid perturbations, including effects of ion collapse due to high-current drive beams. The effects on spectral intensity and photon statistics of the resultant betatron radiation are examined. Our results stand to inform tolerances in input beam quality and potential tunability for betatron radiation experiments due to commence later this year.

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