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## **Emittance oscillations and self-compensation during blow-out beam generation**

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

Blow-out beam generation is an established method to generate uniformly-filled ellipsoidal electron bunches by illuminating the cathode by an ultrashort laser pulse having a parabolic-like transverse profile of laser intensity. A theoretical study of blow-out generation in an APEX-like ultrahigh frequency RF gun revealed emittance oscillations and self-compensation at the gun exit without any additional accelerator components or fields. This regime is observed for a strong space-charge field on the cathode reaching around 30-35% of the accelerating field. The bunch emittance attains its lowest possible value for a given charge. Simulations clearly show an initial growth and a subsequent self-compensation of projected emittance in a divergent electron bunch originating from the effects of: (i) strong space-charge forces of mirror charges on the cathode, (ii) an energy chirp in the bunch and (iii) substantial re-shaping of the electron bunch. The study is in press in *New J. Phys.*, DOI 10.1088/1367-2630/aca5ab.

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### **Footnotes**

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

Yes

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