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## Wakefield effects on dark current bunches for LESA

*Monday, 8 May 2023 16:30 (2 hours)*

Alongside the new LCLS-II facility, a new electron beamline known as Linac to End Station A (LESA) is under construction at SLAC. LESA will use field-emitted dark current from the new superconducting accelerator to search for MeV- to GeV-scale dark matter. To predict the behavior of the dark current in LESA, we must account for the effects of wakefields. In the conventional analysis of long-range wakefields, the bunches are both the sources and subjects of collective effects. Since the contribution of dark current to the wakefield is negligible, the dark bunches are passive recipients of the wakefield kicks. However, we also lose some simplifying assumptions. In contrast to the main bunches, which are generated at a low subharmonic of the RF frequency, dark current is generated on every RF cycle of the source cavity. The dark current bunches may also occupy a much larger proportion of each RF bucket –possibly the entire longitudinal acceptance of the accelerator. These complications lead to effects that are not seen in the main bunches, such as “beating” of the betatron amplitudes along the dark bunch train. In this work, we present the theory behind this interaction and apply it to LESA.

### Funding Agency

### Footnotes

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

Yes

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