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Exploring the necessary conditions for steady-state microbunching at the Metrology Light Source

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Steady-state microbunching (SSMB) is envisioned to enable the generation of high-power coherent synchrotron radiation at an electron storage ring for wavelengths up to the extreme ultraviolet. The underlying mechanism has been shown to be viable in a proof-of-principle (PoP) experiment at the Metrology Light Source (MLS) in Berlin.

An enhanced detection scheme allows systematic studies of the conditions needed for the creation of microbunches within the continuing PoP experiment^{*}. It was found that the generation of coherent radiation from microbunches is favored in specific nonlinear longitudinal phase space structures, known as “alpha buckets”, which arise when the momentum compaction function becomes dominated by higher order terms.

We present the most recent experimental results and their interpretation as well as accompanying simulation results.

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Footnotes

- X. Deng et al., Nature 590, 576–579 (2021) ** A. Kruschinski et al., this conference

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Yes

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