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Steady state microbunching high power light source

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Steady state microbunching (SSMB) proposed by Alexander Chao and Daniel Ratner is a new concept of accelerator light source, which means to maintain the microbunching in storage rings for coherent radiation production. By combining the high coherence and high repetition rate, SSMB can provide very high average power radiation. And the radiation wavelength can cover THz to soft X-ray.
To promote the SSMB physics research and develop a SSMB-EUV light source, a taskforce has been established in Tsinghua University since 2017. Recently, we are continuing the proof of principle experiment and have observed multi-turn coherent radiation by modulating the electron bunch with laser single-turn on MLS storage ring. The experiment results are in very good agreement with theoretical prediction, which proof this kind of mechanism (maintain micro-bunch in storage ring) can work well.
We have also proposed a complete design for high average power EUV radiation based on SSMB. The proposal will provide kW EUV average power at the radiation wavelength of 13.5 nm within 2% bandwidth. We have done the start to end study for this proposal and the researches on the key technologies are also underway. This kind of EUV light source may open a new roadmap to meet the requirements of EUV lithography.

Footnotes

Funding Agency

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Yes

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