Contribution ID: **2281** Contribution code: **TUPL005** Type: **Poster Presentation**

Feasibility study of a hard x-ray FEL oscillator at 3 GeV based on harmonic lasing and transverse gradient undulator

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

We study the feasibility for a hard x-ray FEL oscillator (XFELO) at 3 GeV based on harmonic lasing and transverse gradient undulator (TGU) with strong focusing. We carry out optimization of parameters using the formula developed in 2021 [1] for harmonic lasing XFELO with TGU and strong focusing. From previously assumed x-ray cavity loss of 30-20%, we lowered the assumed cavity loss to 5% (which includs an assumed 1% output coupling). This significantly reduced the required single pass gain to 5%, hence the renewed optimization relaxed the very stringent requirment on the electron beam parameters. After the optimization by analytical formula we confirm the single pass gain using simulation by "GENESIS"code.

[1] L.H. Yu, Gain of Hard X-ray FEL at 3 GeV and Required Parameters, in Proc. of IPAC-2021, MOPAB040.

Funding Agency

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Session Classification: Tuesday Poster Session

Track Classification: MC2: Photon Sources and Electron Accelerators: MC2.A06: Free Electron Lasers