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## **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 (XFEL) 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 XFEL with TGU and strong focusing. From previously assumed x-ray cavity loss of 30-20%, we lowered the assumed cavity loss to 5% (which includes an assumed 1% output coupling). This significantly reduced the required single pass gain to 5%, hence the renewed optimization relaxed the very stringent requirement 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**

DOE

### **Footnotes**

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

Yes

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