



Contribution ID: 1301 Contribution code: TUPL101

Type: **Poster Presentation**

Preliminary design on the accelerator of an infrared free electron laser oscillator

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

We are building a new infrared Free Electron Laser (FEL) facility in China that will produce infrared laser covering the spectral range from 2.5 μm to 200 μm . It is made up of two oscillators generating middle infrared and far infrared laser respectively, which are driven by a single RF linear accelerator (linac) with a tunable beam energy from 12 MeV to 60 MeV. According to the requirement of the FEL physics, the linac is designed with an rms energy spread of less than 0.5%, a transverse rms emittance of less than 40 mm-mrad and a micro bunch length of 4-10 ps with a charge of 1 nC inside. In this manuscript, we present the preliminary design of the accelerator, from the electron gun through the transport line's terminus.

Funding Agency

Work is supported by National Natural Science Foundation of China (12175224, 11905221, 11805200)

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Session Classification: Tuesday Poster Session

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