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Design of the oscillators of an infrared free electron laser facility at Anhui University

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This work presents the oscillator design of a low-gain free electron laser facility under development at Anhui University, China. The mid-infrared and far-infrared oscillators generate lasers with wavelength ranges of 3–40 μm and 30–200 μm , respectively. While the two oscillators differ in electron beam and optical parameters, their infrastructures are similar. An external vacuum driving mechanism for resonant cavity mirror precision adjustment is introduced, featuring symmetrically arranged bellows to balance the vacuum forces. The optical cavity misalignment effects are analyzed with the OPC and wGenesis, and the tolerance of misalignment is proposed. A permanently on site Autocollimating Telescope alignment system was developed to align and verify the coaxiality of the optical axis, undulator magnetic field centerline and electron beam trajectory at any time. A POP IN layout with precision outside vacuum driving mechanism was also designed to meet alignment requirements. An indicating laser system will be installed downstream of the oscillator to support the installation of beamlines and endstations.

Footnotes

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