Contribution ID: **241** Contribution code: **TUCI04** Type: **Invited Oral Presentation**

First operation of a two-color mode in a dual-oscillator infrared free-electron laser

Tuesday 20 August 2024 15:55 (25 minutes)

Since 2013 the infrared FEL at the Fritz Haber Institute (FHI FEL) has been providing intense, pulsed mid-infrared (MIR) radiation continuously tunable from <3 μm to >50 μm for in-house users. In 2023 an additional short-Rayleigh-range far-infrared (FIR) FEL was commissioned lasing from <5 μm to >170 μm. In addition, a 500 MHz kicker cavity has been installed downstream of the electron accelerator. It deflects the electron bunches alternatingly left and right by an angle of ±2° thereby splitting the high-repetition-rate (1 GHz) electron bunch train into two bunch trains of half the repetition rate each; one is steered to the MIR FEL and the other one to the FIR FEL. The wavelengths in both FEL's can be tuned independently over wide ranges of up to a factor of four by undulator gap variation. In addition, 2-color operation is also available at reduced repetition rates (e.g. 55.5 MHz of both MIR and FIR pulses). Furthermore, two additional small dipole magnets upfront and behind the kicker cavity permit conventional single-color operation of either the MIR or the FIR FEL when the 500 MHz kicker field is off. Regular user operation in 2-color mode is scheduled to start in 2024.

Footnotes

Funding Agency

Primary author: SCHÖLLKOPF, Wieland (Fritz-Haber-Institut der Max-Planck-Gesellschaft)

Co-authors: TODD, Alan (AMMTodd Consulting); DOWELL, David (SLAC National Accelerator Laboratory); MEIJER, Gerard (Fritz-Haber-Institut der Max-Planck-Gesellschaft); VON HELDEN, Gert (Fritz-Haber-Institut der Max-Planck-Gesellschaft); JUNKES, Heinz (Fritz-Haber-Institut der Max-Planck-Gesellschaft); RATHKE, John (JW Rathke Engineering Services); YOUNG, Lloyd (LMY Technology); DE PAS, Marco (Fritz-Haber-Institut der Max-Planck-Gesellschaft); GEWINNER, Sandy (Fritz-Haber-Institut der Max-Planck-Gesellschaft); GOTTSCHALK, Stephen (STI Magnetics LLC); SCHULTHEISS, Tom (TJS Technologies); COLSON, William (Naval Postgraduate School)

Presenter: SCHÖLLKOPF, Wieland (Fritz-Haber-Institut der Max-Planck-Gesellschaft)

Session Classification: FEL oscillators & IR-FEL

Track Classification: FEL oscillators & IR-FEL