

Lawrence Berkeley National Laboratory

Recent Work

Title

Design Overview of an Infrared Free Electron Laser for the Chemical Dynamics Research Laboratory at LBL

Permalink

<https://escholarship.org/uc/item/4hv9x962>

Authors

Chattopadhyay, S.
Bengtsson, J.
Edighoffer, J.
et al.

Publication Date

1991-05-01

Design Overview of an Infrared Free Electron Laser for the Chemical Dynamics Research Laboratory at LBL, * S. CHATTOPADHYAY, J. BENGTTSSON, J. EDIGHOFFER, R. GOUGH, C. KIM, K.J. KIM, A.H. KUNG, W. STEIN⁺⁺, B. TAYLOR, M. XIE, Accelerator and Fusion Research Division, Lawrence Berkeley Laboratory, University of California, Berkeley, CA 94720—An Infrared Free Electron Laser (IRFEL) is being designed for the Chemical Dynamics Research Laboratory (CDRL) at LBL. The FEL is based on a 50 MeV RF linac (side-coupled, standing wave type), synchronized to the Advanced Light Source (ALS). It will produce intense (100 μ J per micropulse), narrow bandwidth (narrower than 0.1%) radiation between 3 μ and 50 μ . In the design, we pay particular attention to the FEL stability issues and require that the fluctuations in electron beam energy and in timing be less than 0.05% and 0.1 ps respectively. The FEL spectrum can then be stabilized to about 10^{-3} , or if grating is used, to 10^{-4} . We discuss various sources of fluctuations, as well as the feedback and feedforward schemes to reduce these fluctuations.

* This work was supported by the Director, Office of Energy Research, Office of Basic Energy Sciences, Materials Sciences Division, of the U.S. Department of Energy under Contract No. DE-AC03-76SF00098.

⁺⁺ Industrial Radiation, Inc., 124 Monte Rey Dr. N., Los Alamos, NM 87544.