

Working Group 3

Topics in laser-electron beam interaction

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**70 YEARS OF
DISCOVERY**

A CENTURY OF SERVICE



Thrust 3: Topics in laser-electron beam interaction

Consider optimal experimental conditions for electron-photon interactions, such as for Compton scattering experiments and IFEL acceleration. Comment on what is achievable with present facilities and what capabilities will be needed to support research efforts over the next decade. Focus primarily on identifying the key experimental deliverables and milestones as opposed to the laser R&D required to support those deliverables.

Active ATF Experiments

- Inverse Compton Source for Extreme Ultraviolet Lithography
- Surface Wave Accelerator and Radiation Source Based on Silicon Carbide
- NOCIBUR: an inverse free electron laser decelerator experiment
- Nonlinear Inverse Compton Scattering
- MEMS Undulator for EUV Lasers
- High Duty Cycle IFEL

What are we Looking for?

- Preferred upgrade path from the point of view of laser-particle interaction research
- Current lasers suitability/availability
- Identify major milestones in electron-laser interaction research and how these relate to laser parameters
- Identify prioritizations in laser development
- How can present facilities complement each other. Should R&D be in multiple directions at different facilities
- Collaboration from the community

Survey Highlights - Landscape

- Electron acceleration by IFEL
- Compton Scattering
- Laser/electron structure interactions (dielectrics)

Survey Highlights - Needs

- Longer Wavelength
 - IFEL
 - Compton
- Higher Power
 - Increased IFEL gradient (~ 100 MV/m demonstrated already)
 - High-flux Compton
- Shorter Pulse
 - DLA
- Polarization
 - Linear
 - Circular
- Shot-Shot Stability
 - Accelerator applications – electron beam stability
- Electron beam
- Secondary lasers