The Beams and Applications Seminar Series

Dynamics and performance of the x-ray free-electron laser oscillator with crystal cavity

Ryan Lindberg, ASD-ANL

Bldg. 401, Room B2100
Friday, Oct. 22, 1:30 PM

Host: Louis Emery

Abstract: The x-ray free-electron laser (FEL) oscillator is predicted to provide pulses of ~10^9 temporally coherent photons with extremely narrow bandwidths at a ~1 MHz repetition rate. Such a source would provide complementary x-ray characteristics to presently operational/planned FELs based on self-amplified spontaneous radiation (such as the LCLS).

We discuss the physics of the x-ray FEL oscillator including both a simple cavity that uses two Bragg crystal mirrors and a four-crystal geometry that can be tuned in photon energy. We present simulations results from both cavity configurations using the FEL code GINGER that has been modified to include the frequency and angular acceptance of the Bragg crystals along with the transverse radiation dynamics in the x-ray cavity. The four-crystal cavity simulations indicate output pulses with peak power ~MW and normalized bandwidth ~10^{-6} that can be tuned in energy by a few percent. We conclude with some preliminary tolerance analysis and future research directions.

For more information visit

http://aps.anl.gov/News/Meetings/Beams_and_Applications_Seminars/

Visitors from off-site please contact Carmen Nolasco (mnolasco@aps.anl.gov, 630-252-6159) to arrange for a gate pass.