

High Efficiency Free Electron Laser Workshop

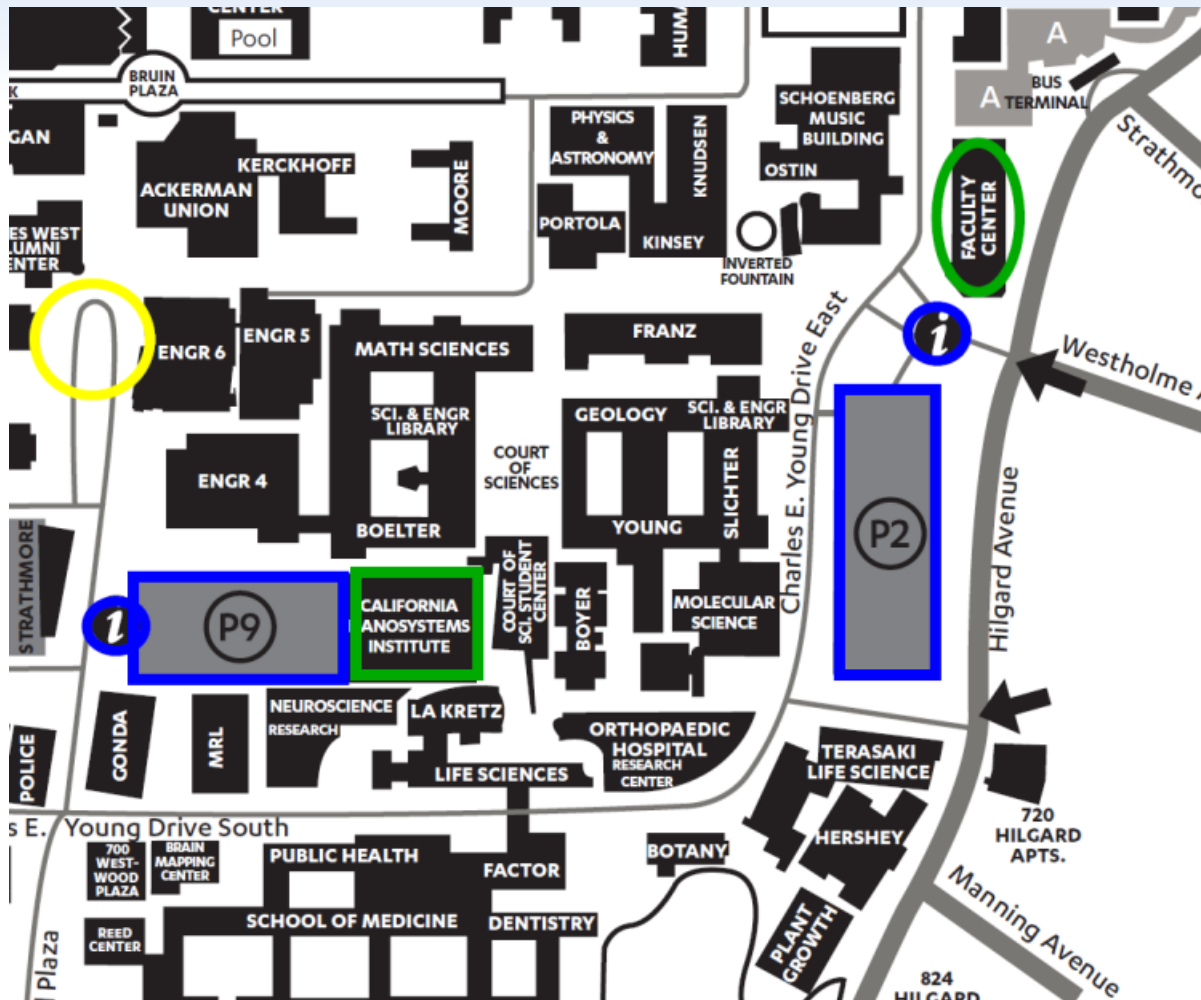
Introductory remarks

University of California at Los Angeles

April 11-13, 2018

UCLA

Map and locations



- Confirm your availability for dinner tonight at 6 pm
- Request vegetarian option if needed

Agenda	11-Apr	12-Apr	13-Apr
	8.30-8.50 Breakfast	8.30-9.00 Breakfast	8.30-9.00 Breakfast
Legend	8.50 - 9.00 Welcome and Introduction. Workshop Chairs Chair: A. Zholents	Chair: H. D. Nuhn	Chair: C. Pellegrini
Applications	9.00-9.30 W. Fawley (Elettra-SLAC) Review of Tapering Physics	9.00-9.30 Y. Park (UCLA) Permanent magnet based strong focusing undulator design for TESSA-266	9.00-9.30 D. Cocco (SLAC) Wavefront preserving optics development for high power FELs
Physics of high efficiency FEL	9.30-10.00 J. Hastings (SLAC) Applications of TW-class ultrashort X-ray pulses in scientific research	9.30-10.00 F. O'Shea (RBT) Superconducting undulator for TW XFEL	9.30-10.00 N. Sudar (UCLA) Maximizing capture in ponderomotive potential: double buncher results
Undulator technology	10.00-10.30 P. Naulleau (LBNL). Applications of high efficiency FELs for EUV lithography	10.00-10.30 M. Calvi (PSI) Intra undulator module linear taper with tilted TGU modules	10.00-10.30 M. Guetg (Stanford) Generation of high-power, high-intensity, short, X-ray free-electron-laser pulses
Numerical methods	10.30-11.00 Coffee Break Chair: A. Murokh	10.30-11.00 Coffee Break Chair: G. Andonian	10.30-11.00 Coffee Break Chair: P. Musumeci
Experimental opportunities	11.00-11.30 C. Pellegrini (SLAC) Reaching the Schwinger field with TW XFELs	11.00-11.30 H-D. Nuhn (SLAC) Variable gap tapering for LCLS2 undulators	11.00 -11. 20 S. Webb (Radiasoft) Period-Averaged Maps for Modeling Tapered Undulators
Beam dynamics	11.30-12.00 C. Phipps (Photonic Associates). Power beaming with high efficiency FELs	11.30-12.00 T. Limberg (DESY). Optimization of SRF linac for high efficiency XFEL	11.20 - 11.40 P. Anisimov (LANL) High-Efficiency Free Electron Lasers with Pinched Electron Beams
			11.40 - 12.00 Discussion and close-out
	12.00-13.15 Lunch Chair: H. Deng	12.00-13.15 Lunch Chair: K.J. Kim	
	13.15-13.45 C. Emma (SLAC) Optimization of TW XFEL	13.15-13.45 J. Wu (SLAC) Results from machine learning tapering at LCLS	
	13.45 - 14.15 S. Reiche (PSI) Computational methods for high efficiency FELs	13.45 - 14.15 H. Deng (SINAP). High brightness FEL amplifier using chirped beam and XFEL seeding	
	14.15-14.45 Z. Wang (SINAP) Generating isolated TW x-ray pulses via chirped laser enhanced FEL	14.15-14.35 J. Duris (SLAC) Effects of sinusoidal tapering on FEL efficiency	
	14.45-15.15 Coffee Break Chair: S. Reiche	14.35-15.05 Coffee Break Chair: W. Fawley	
	15.15-15.45 S. Serker (DESY) Approaches to obtain TW-class pulses at XFEL	15.05-15.25 C. Feng (SINAP) Eliminating the microbunching-instability-induced sideband in a soft x-ray self-seeding FEL	
	15.45-16.15 J. Rosenzweig (UCLA) Ultra-high brightness in normal-conducting RF linacs	15.25-15.45 K. J. Kim (ANL) High Efficiency FEL oscillators	
	16.15-16.35 S. Antipov (Euclid) Tapered Flying RF Undulator	15.45-16.05 P. Musumeci (UCLA) TESSO	
	16.35-16.55 G. Wang (Dalian) Generation of Two-Color VUV Free Electron Laser at Dalian Coherent Light Source	16.05-16.25 A. Murokh (RBT) Optical Energy Recovery Linac ICS Gamma-ray Source	
	18.00-20.00 Workshop dinner. UCLA Faculty Club		

Motivation

- Tapering and high efficiency were popular in the '80s.
- Why back in fashion now?
- Lots of recent interest in tapering from FEL community
 - XFEL era -> Users always want more power
 - Higher brightness electron beams
 - New developments in undulator technology
 - Revolution in computational power and methods
- Many groups have recently published on the topic
- The last two FEL prize talks have been on tapering !



Excellent subject for a review paper !

- Lots of existing literature.
- Value of old lessons.
- Re-examine in the light of new challenges and new opportunities.
- Any sign-ins?

Workshop Charge

- Identify applications that would benefit from high efficiency FEL and tapered undulators
- Identify priority research directions to develop high (i.e. 10 % or higher) conversion efficiency.
- How does tapering and high efficiency goals drive the electron beam dynamics optimization?
- Compare and assess different undulator and focusing solutions.
- What are the computational challenges of high efficiency FELs?