

Status September 2024 of LCLS-II injector

LCLS-II NC gun operates at CW 186MHz; gun energy 645keV

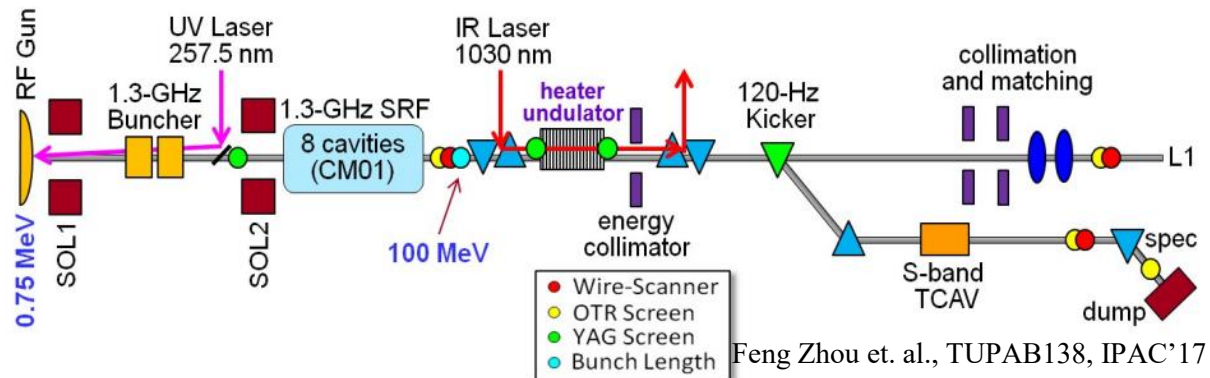
Emittance Measurements @88MeV; Gun gradient at 17.5-19.5 MV/m [1]

Drive laser pulse length 16-18ps FWHM Gaussian

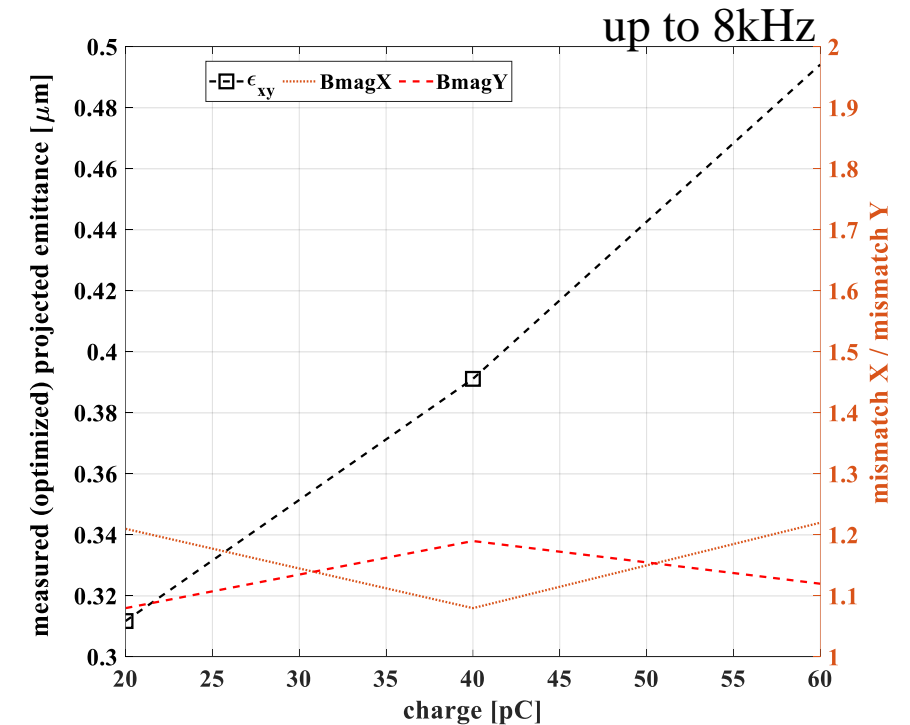
Gun energy was precisely measured 645keV

Buncher amplitude was measured ~190kV

Charge	X emittance	X matching	Y emittance	Y matching	Bunch length @02	Bunch length @04
40	0.45	1.08	0.34	1.19	0.418	0.542
20	0.36	1.21	0.27	1.08	0.245	0.483
60	0.66	1.22	0.37	1.12	0.757	0.881



Achieved ~0.5 μ m emittance at the desired bunch length of <0.9mm rms for desired charge of 50-60pC



[1] Zhou F, Adolphsen C, Dowell D and Xiang R (2023), Overview of CW electron guns and LCLS-II RF gun performance. Front. Phys. 11:1150809. doi: 10.3389/fphy.2023.1150809

SHINE, status 31.12.2024, gun at 25 MV/m

SSRF Breaking News: http://ssrf.sari.ac.cn/kydt/202504/t20250410_524002.html

Bunch charge [pC]	Projected emittance [μm]	Sliced emittance [μm]
51.1	0.46	0.33
100	0.56	0.44

"At the 50 pC injector acceptance working point, the bunch charge is 51.1 pC, the electron beam energy reaches 100.2 MeV, the repetition rate reaches 100.3 kHz, and the single-pulse peak current is 12.8 A. The normalized projected and slice emittances are 0.46 mm·mrad and 0.33 mm·mrad, respectively—all meeting the design specifications.

At the 100 pC injector design working point, the bunch charge is 100.0 pC, the single-pulse peak current is 10.1 A, and the normalized projected and slice emittances are 0.56 mm·mrad and 0.44 mm·mrad, respectively. The beam energy, peak current, and slice emittance all meet the design specifications."

Z. Jiang et al, MOPC47, IPAC'24

