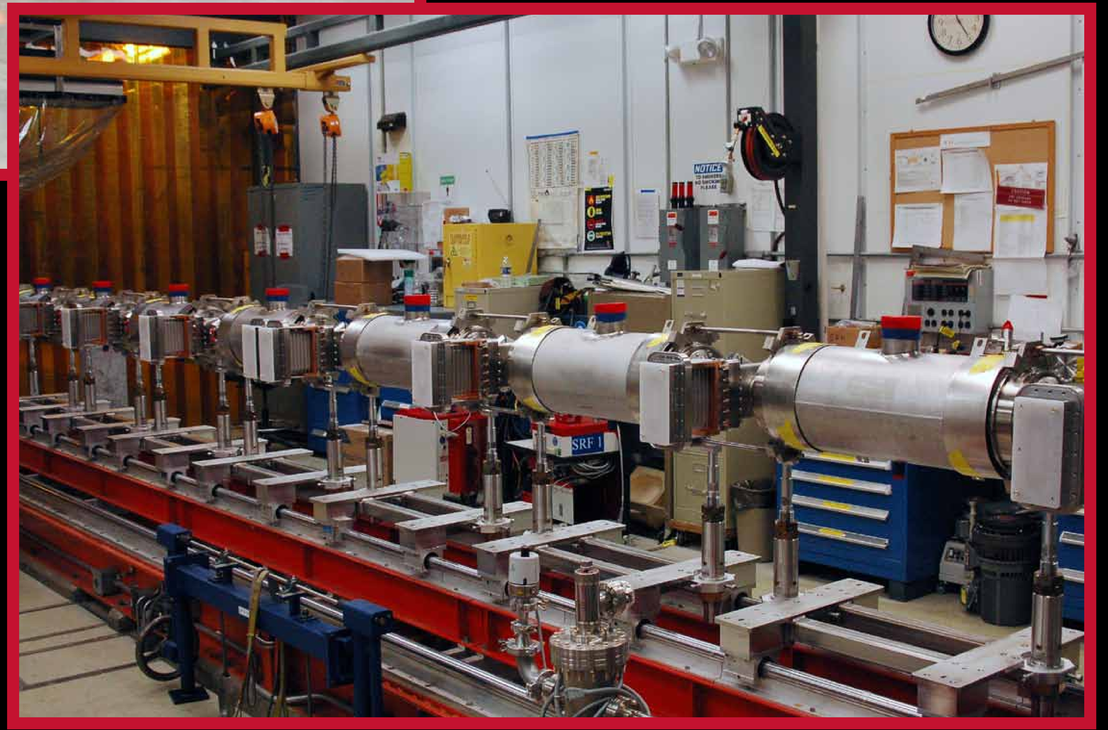
R&D STUDIES FOR NEXT GENERATION LIGHT SOURCES

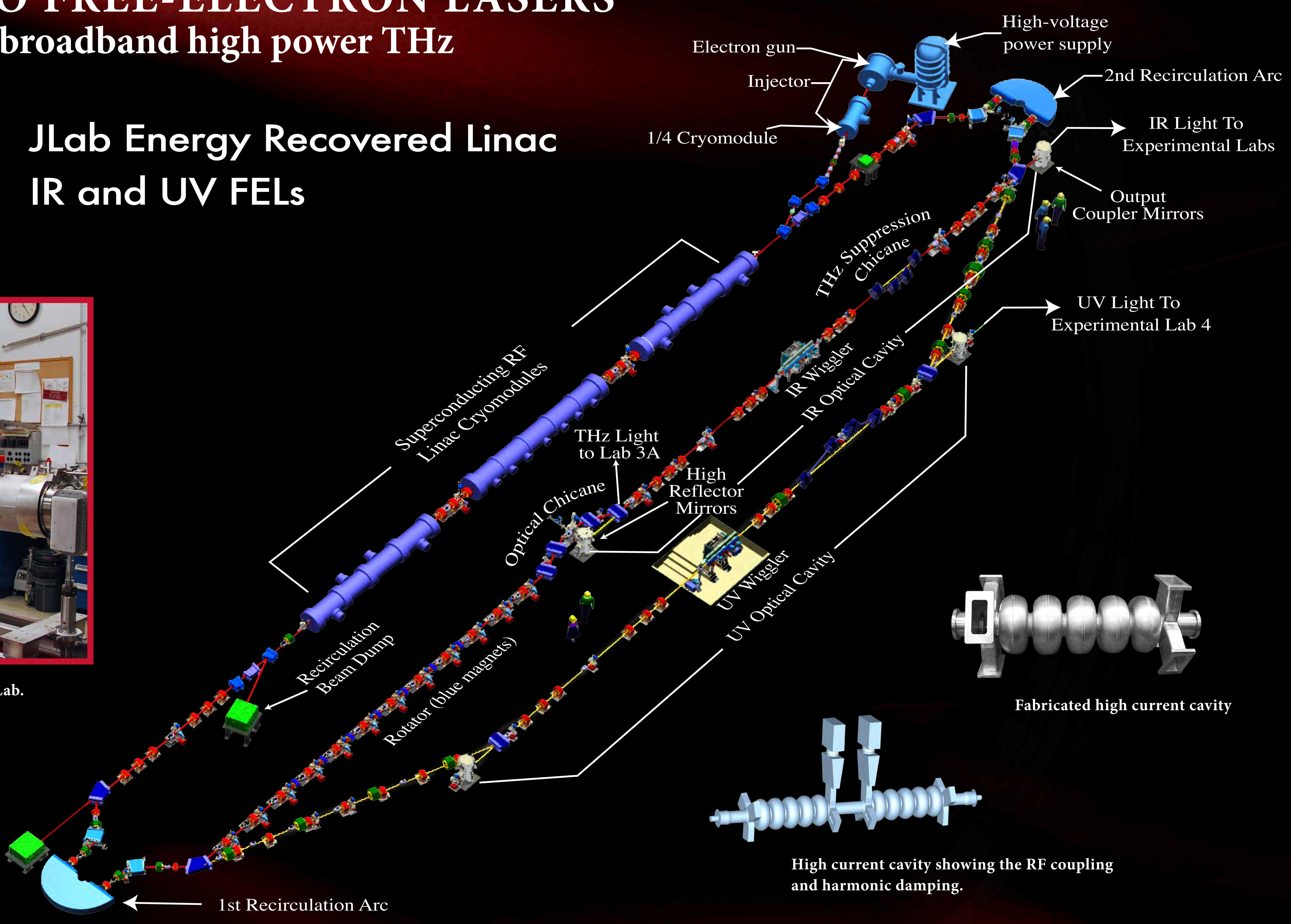
High Gradient Superconducting Linac installed at FEL for R&D tests.



High gradient s-c linac under construction at Jefferson Lab.

TWO FREE-ELECTRON LASERS
plus broadband high power THz

JLab Energy Recovered Linac
IR and UV FELs



Fabricated high current cavity

High current cavity showing the RF coupling and harmonic damping.

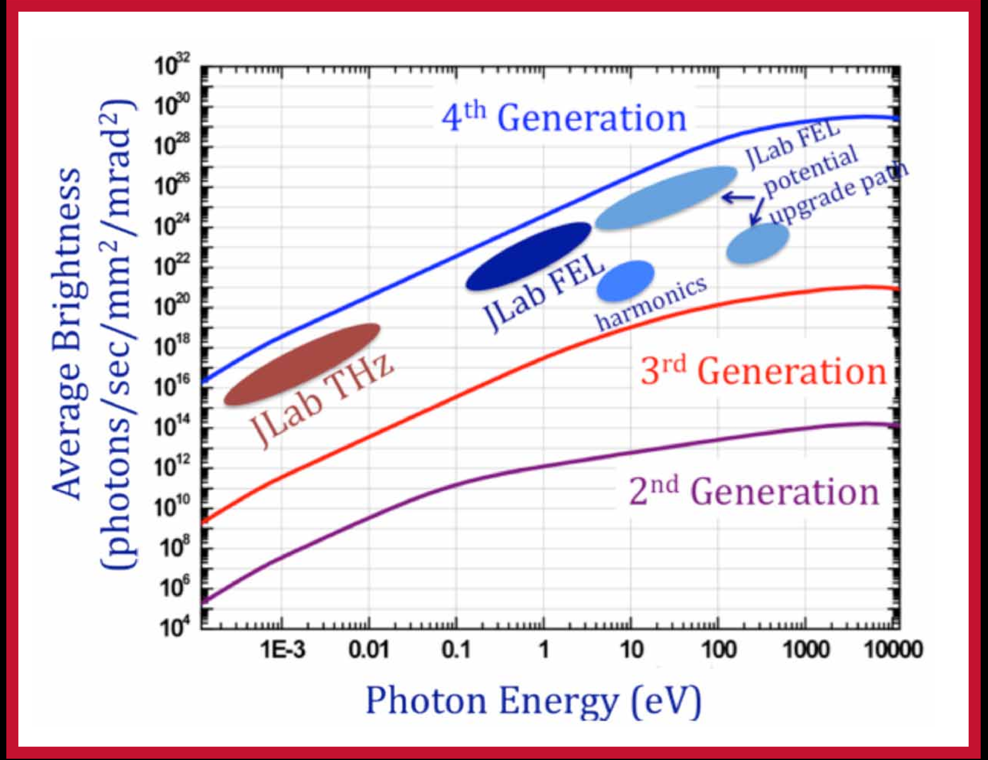
KEY ACCELERATOR TECHNOLOGY FOR NEXT GENERATION LIGHT SOURCES

- High gradient cryomodule
- High current cryomodule
- CW injector
- Dynamics & recirculation of low emittance beams
- FEL physics

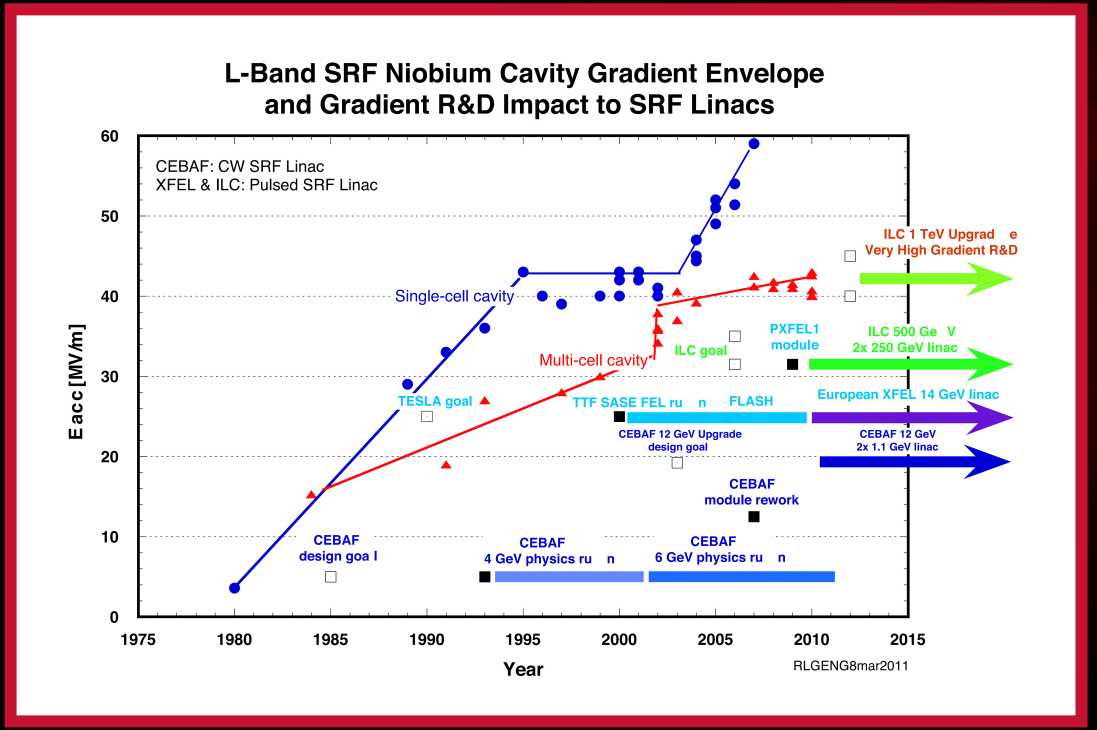
TECHNICAL SPECIFICATIONS

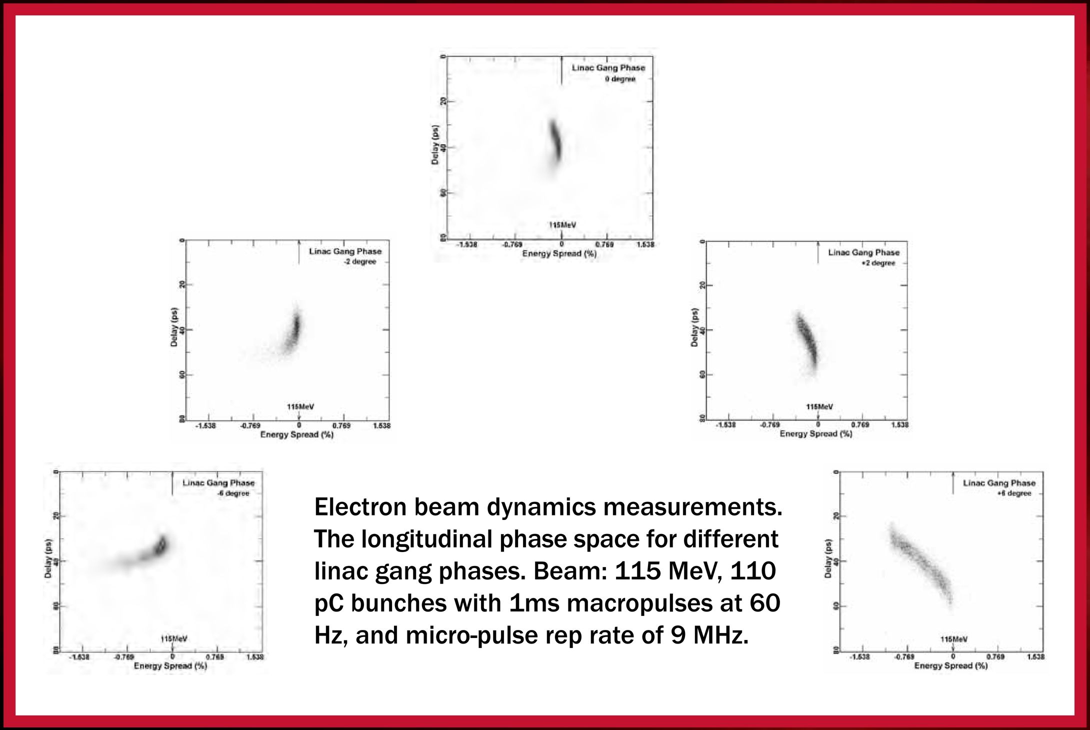
Electron beam
- Electron beam energy 135 MeV, Energy Recovered Linac
- 135 pC pulses up to 75 MHz
- FWHM < 1 ps

Photon beams
- UV-FEL: 1.5 eV - 3.5 eV fundamental 20 microJ/pulse
- VUV: 10 eV, 3rd harmonic, 20 nanoJ/pulse
- IR-FEL: 0.2 - 1 eV fundamental 120 microJ/pulse
- THz: 0.1 - 5 THz 1 microJ/pulse



Lightsource landscape showing 2nd, 3rd, and 4th generation sources, with the JLab FEL operational parameters indicated. These generic plots were made using an electron beam energy of 3 GeV, a bending radius of 5m, and for 1nC electron bunches at 100 MHz (100 mA). Source sizes used were 500 × 1000, 10 × 100, and 5 × 5 microns respectively for the 2, 3 and 4th generation sources. 3rd generation sources were elevated by 500 for insertion devices, and 4th generation sources were elevated by a further 1010 to account for longitudinal coherence.





THE JEFFERSON LAB FEL TEAM

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