

First Lasing of the Jefferson Lab UV Demo Laser

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On behalf of the Jefferson Lab FEL team

August 23, 2010

- Installation timeline
- The Cornell Undulator A prototype
- Lasing results

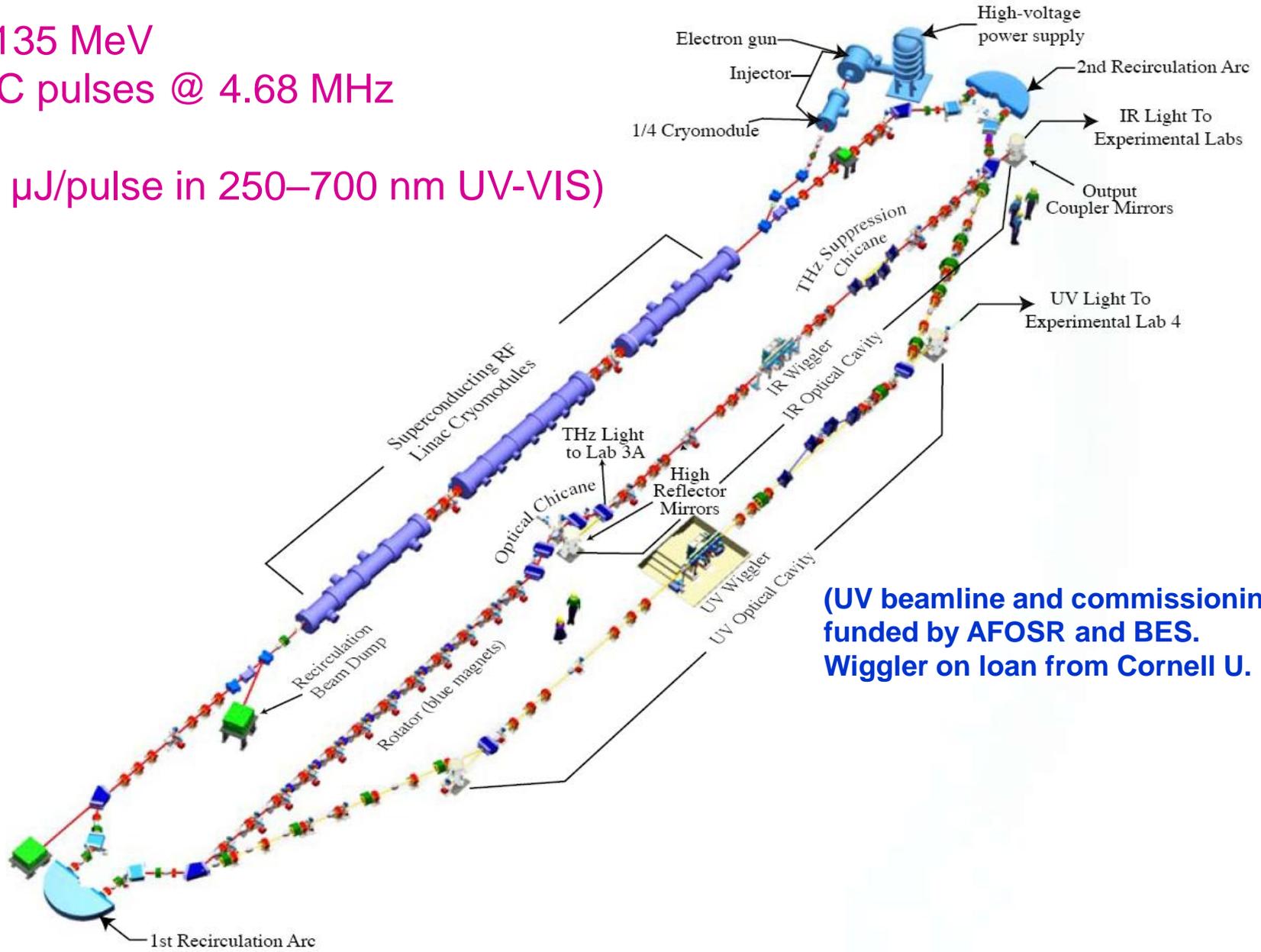
Acknowledgements – This work was funded by AFOSR and BES, and by DOE
Contract DE-AC05-060R23177 .

UV Demo Beamline Layout

$E = 135 \text{ MeV}$

67 pC pulses @ 4.68 MHz

(>20 $\mu\text{J}/\text{pulse}$ in 250–700 nm UV-VIS)

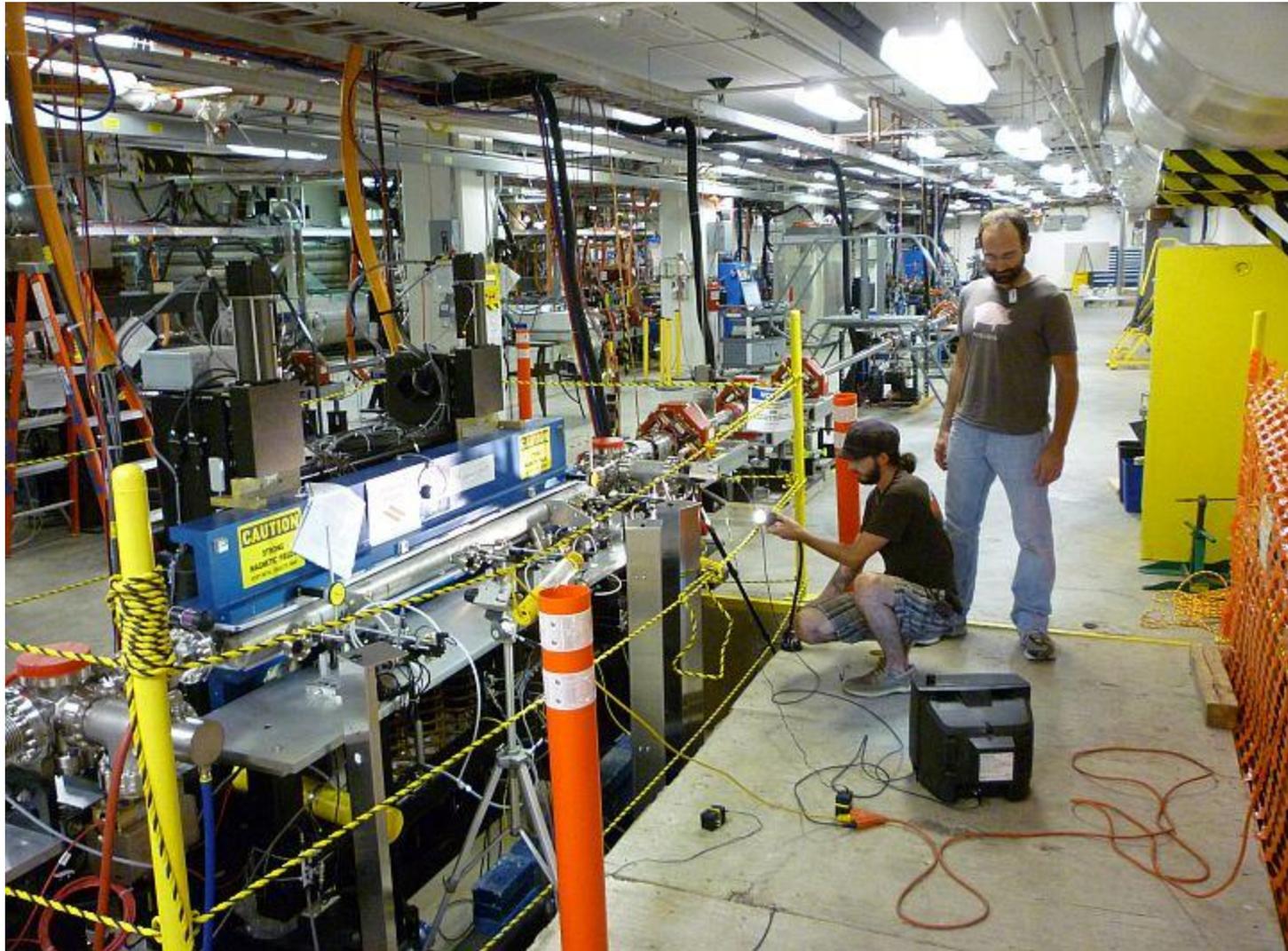


(UV beamline and commissioning funded by AFOSR and BES. Wiggler on loan from Cornell U.)

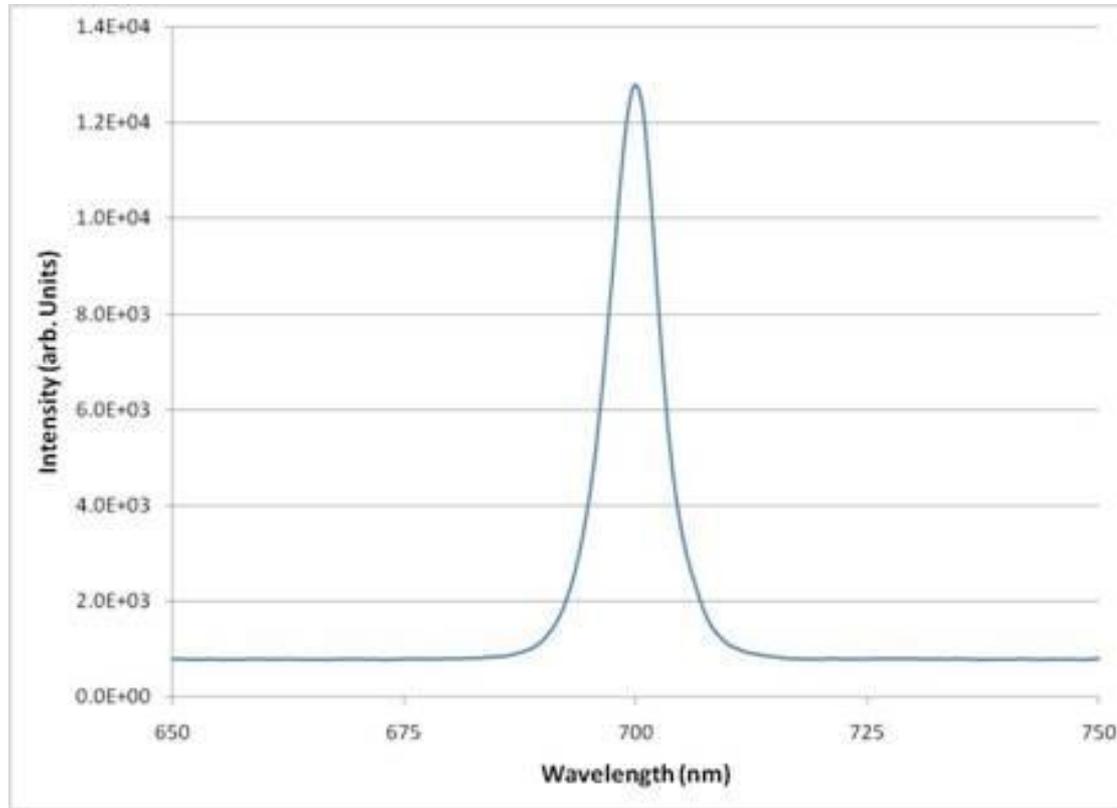
Commissioning Timeline

- January 2006 - Install and commission Cornell wiggler with new gap mechanism.
- Spring and Summer 2009 – Install beamline components except for optical cavity and wiggler chamber.
- Fall 2009 – Pulsed beam through UV beamline.
- Spring 2010 – Install new zone 3 module and commission.
- June 2010 – Lase at 630 nm, 67 pC in IR laser with 135 MeV beam.
- July 2010 – Recirculate laser quality 1 mA CW beam through wiggler sized aperture.
- August 17, 2010 – First electron beam through wiggler with 8 mm clear aperture.
- August 19, 2010 – First lasing, 165 W CW at 700 nm.

Cornell Undulator A Prototype



Lasing Spectrum



Lasing CW with 165 W of power

Images while lasing at 100W

Light scattered from HR mirror

Light scattered from power probe



Power meter

Time dependent diagnostics

Where to from Here?

- Should lase with 400 nm mirror set soon.
- Lase at 3.33 eV with hole coupler and characterize 3rd harmonic radiation.
- Install cryogenic mirrors to allow lasing at the 1 kW level.
- Raise energy to push down to ~250 nm.

The Jefferson Lab FEL Team



April 24, 2009

This work supported by the Office of Naval Research, the Joint Technology Office, the Commonwealth of Virginia, the DOE Air Force Research Laboratory, The US Army Night Vision Lab, and by DOE under contract DE-AC05-06OR23177.