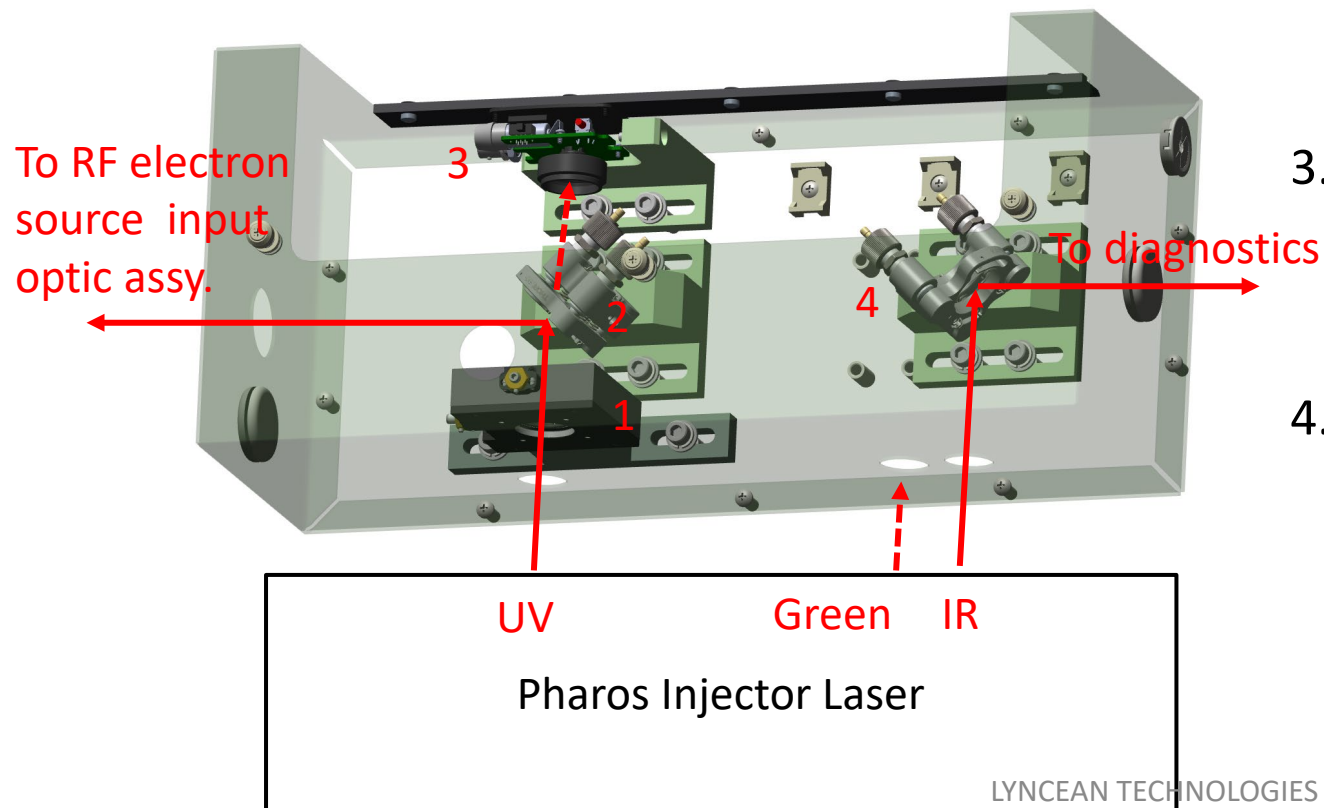


Injector Laser UV Transport System

2021-02-22

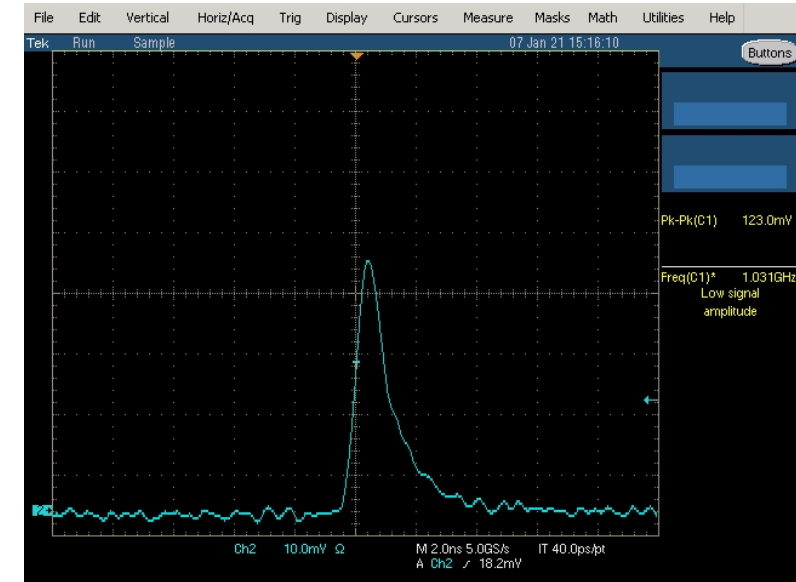
Laser UV Output Assembly



1. UV laser beam goes through the 4 mm aperture that is held in the adjustable holder
2. It is reflected by a mirror that is held in the precision mount with two actuators. Actuators can be used to adjust beam position on photocathode during operations
3. Photodetector (photodiode) is placed behind the mirror in the beam path. It detects leakage through the mirror and this signal is used to monitor UV pulses during operation
4. Movable mount with highly reflective IR/Green mirror can be used to direct IR (shown) or Green beams toward diagnostics during laser service/tune up.

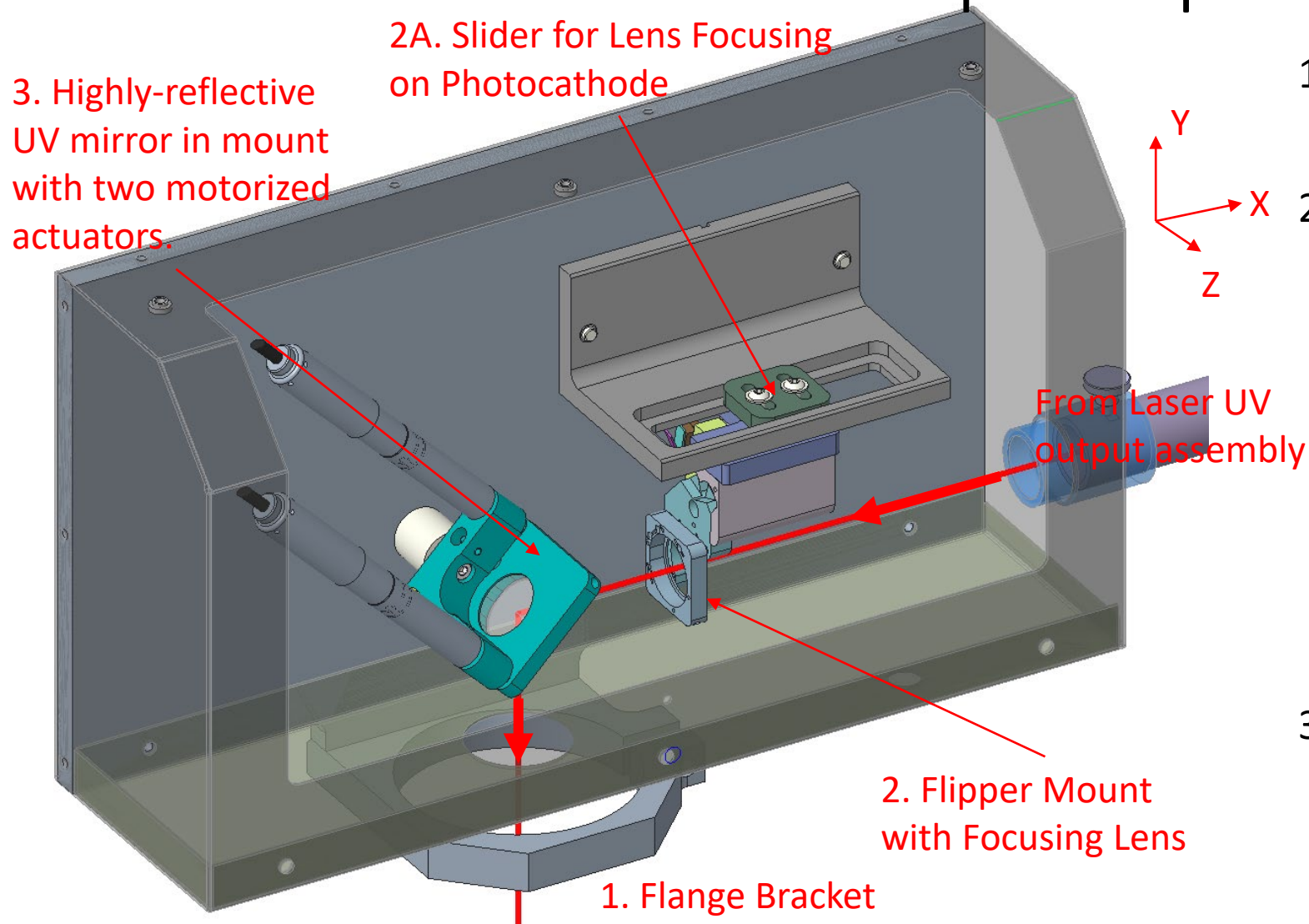
Laser UV Output Assembly – Comments on Commissioning / Tests

- Item 1 - Aperture: The UV beam is truncated by the 4 mm aperture during RF electron source operation. The aperture was aligned for the RF electron source test. The pulse energy was measured before and after the aperture (see Pharos LTI test report TR000003 Fig. 11). An image with beam size measurement is provided in the document “RF Gun Test Comments ELI- LTI response v4.docx”, under “C. Injector Laser system”, Comment 4
- Item 2 – Mirror: The mirror was aligned for the RF electron source test and stayed in position during the entire test
- Item 3 – Photodetector: The output from the photodiode was monitored during the RF electron source test (see image on the right)
- Item 4 – IR/green mirror: this was not used during the test. Any IR tests were done during the Pharos test as described in TR000003 using the IR output port of the Pharos laser directly.



Signal from UV photodiode (Item 3) during RF electron source test (showing single UV pulse)

RF Electron Source Input Optic Assembly



1. The assembly is mounted on the optical cross using single flange bracket
2. Flipper mount with positive lens (AR coated). Lens is inserted in the beam for photocathode cleaning (higher fluence/intensity is required). During normal operation lens is out of the beam path (flipper mount in horizontal position)
 - A. Lens position along the beam (X-direction) can be adjusted $\pm 35\text{mm}$ for beam spot (intensity) optimization. Lens position can also be adjusted across the beam in Z and in Y direction to center beam spot on Photocathode during cleaning
3. Mirror position is fixed during normal operation. Actuators on the mirror mount are used to scan beam on photocathode during cleaning.

RF Electron Source Input Optic Assembly – Comments on Commissioning / Tests

- Item 2 – lens on flipper mount: The lens was first aligned and optimized for intensity, then used for cathode cleaning (RF electron source test report TR000005, Sec. 3.2 / 4.2)
- Item 3 – mirror with scanning actuators: The UV beam was scanned using these actuators for cathode cleaning (see above)