BROOKHAVEN NATIONAL LABORATORY PHYSICS DEPARTMENT	Number: PO-P-ATF-0024 Effective: 08/12/2004	Revision: 1 Page 1 of 2
Subject: ATF Nd: YAG Laser Alignment Procedure		Prepared by: Marcus Babzien
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ATF Nd: YAG Laser Alignment Procedure

This procedure describes how to restore optimum alignment to the Nd:YAG laser. It shall only be performed by laser physicists authorized to work on the system. This procedure is recommended whenever IR energy drops more than 30%, or if the rms fluctuation over 20 shots is more than 2%. All adjustments should be done very methodically, as the system typically maintains very stable alignment and only small changes are needed to return to optimum performance. Maximizing transmission with the power meter should be done slowly because the thermal response time is 1-2 seconds, and significant changes can be as small as a few parts per mil of total power. In addition, some mirror mounts may exhibit backlash and should always be moved in small steps. Transmission percentages from one power meter position to the next should be compared at each step to verify transmission is close to prior alignments listed in the logbook.

1. Make sure both amplifiers are turned off, insert front end quarter wave plate, and position it normal to the beam and rotate it for maximum transmission.
2. Position beam on oscillator front end camera (42) and maximize transmission through spatial filter. Current centroid positions and camera settings are listed in the front of the YAG logbook in the YAG room. Acceptable alignment tolerance for CCD centroids is ±2 pixels.
3. Center beam at relay aperture on preamp output camera (45, use flip-up mirror and adjust filter wheel for proper intensity).
4. Maximize transmission through preamp spatial filter to at least 93%.
5. Center beam on preamp spatial filter irises, realign pinhole if needed.
6. Position beam on preamp 1/3 pass camera (44).
7. Retroreflect beam for maximum power transmission into modulator arm.
8. Again retroreflect beam for maximum preamplifier output (Conoptics Pockels cell DC bias must be adjusted to ~+55V).
9. Position beam on preamp output camera (45) and maximize transmission into amplifier.
10. Check beam position and diffraction fringes on amp 1 pass camera (46) and iris.
11. Maximize transmission through vacuum spatial filter and beam symmetry on amp output camera (47), center beam on downstream iris.
12. Readjust Conoptics Pockels cell DC bias to –42V.
13. Remove front end quarter-wave plate, being careful not to bump other optics nearby.
14. Start system as normally and readjust Pockels cell bias for best rejection of satellite pulses as observed on photodiodes.
15. Verify good output energy, small fluctuations (<2% standard deviation over 20 shots).
16. Align the UV through the last two irises before the periscope and to the gun hutch.

17. In the gun hutch, center the UV beam on each of the irises with the preceding mirror.
18. IR for CO2 slicing should be aligned through the two irises before the persicope. If further alignment is required to center the beam in the CO2 room, use the top periscope mirror on the YAG table.