Point Absorber Actuator Alignment Procedure

Purpose

This procedure describes the alignment of the Point Absorber (PA) actuator using the auxiliary red alignment laser integrated into the actuator assembly.

Alignment Source and Laser safety

The PA actuator is equipped with an incoherent heating source. A red diode laser has been co-aligned with the heating beam to facilitate the alignment procedure.

The alignment laser is:

- Newport LPM635-03C
- Wavelength: 635 nm
- Power: 3mW
- Beam Diameter: 1.5mm @ $1/e^2$
- Beam Divergence Full Angle: <1.2 mrad

The alignment beam is injected into the vacuum tower through a ZnSe viewport of diameter 158 mm and thickness 12 mm. The transmission of the ZnSe window at 635nm is 0.57, reducing the laser power to 1.71mW. (M. N. Polyanskiy. Refractiveindex.info database of optical constants. *Sci. Data* **11**, 94 (2024) https://doi.org/10.1038/s41597-023-02898-2)

While proper alignment laser for 635nm are not available, by using the laser google with filter YG3, they have a transmittivity at 635nm of 0.41, reducing the power of the laser to 0.7mW and becoming class 2.
(https://www.thorlabs.com/item/LG1)

Procedure

1. Tower Access

The safety procedure to access the tower must be followed. Only authorized people will enter the tower, keeping the number of the people at the minimum required.

2. Positioning of the TCS Team

The TCS team remain outside the tower, on the platform, with access to the Point Absorber actuator.

3. Alignment Procedure

- Switch on the red alignment LED once the people are inside the tower but not in the beam;
- The operators inside the tower identify the laser spot on the mirror surface.
- Using the TX and TY picomotors of the Point Absorber actuator, the TCS team adjusts the beam position.
- The operator inside the tower provides feedback on the spot position.
- The alignment is completed when the laser spot is centred on the mirror.