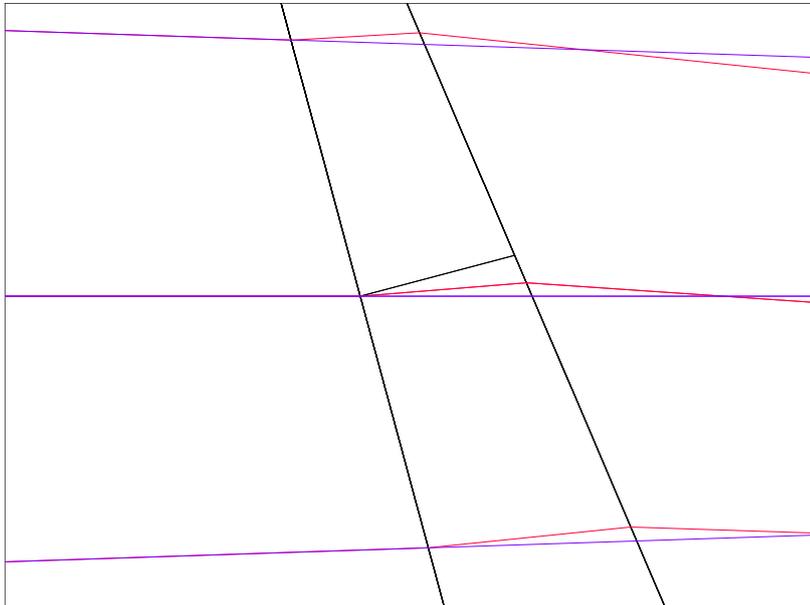


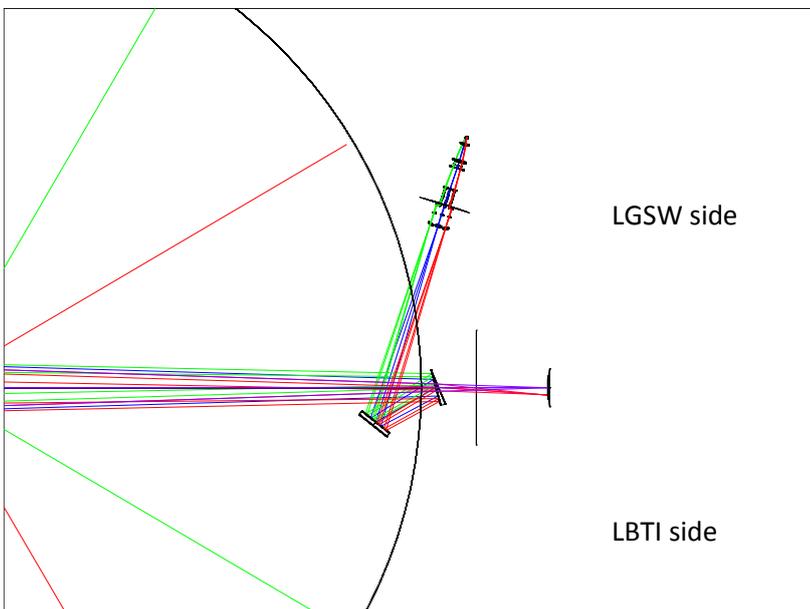
TELESCOPE RECOLLIMATION FOR ARGOS



Effects on light beam transmitted through the ARGOS dichroic (AOI=15deg, t=20mm, a=0.08deg):

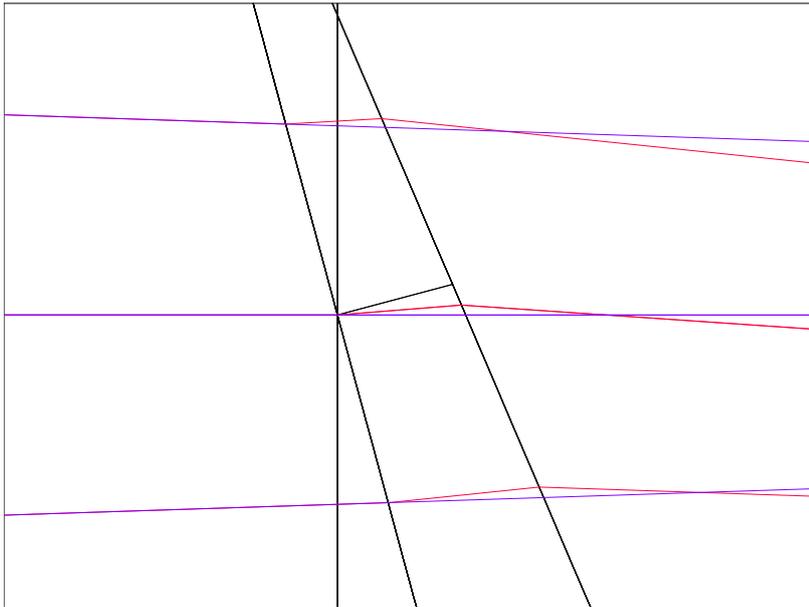
1. Offset by 1.6mm towards the thinner edge. The offset value depends from the AOI, the glass type and thickness: $y = (n-1) t \text{ AOI} / n$

2. Tilt of 0.04deg (0.7mrad) towards the thicker edge. The tilt value depends from the wedge: $d = (n-1) a$



Current situation at LBT (dichroic wedge exaggerated 100 times in figure, LBT SX side represented):

- Dichroic thicker edge toward LBTI
- Laser light reflected toward LBTI by dichroic and then toward LGSW by fold mirror

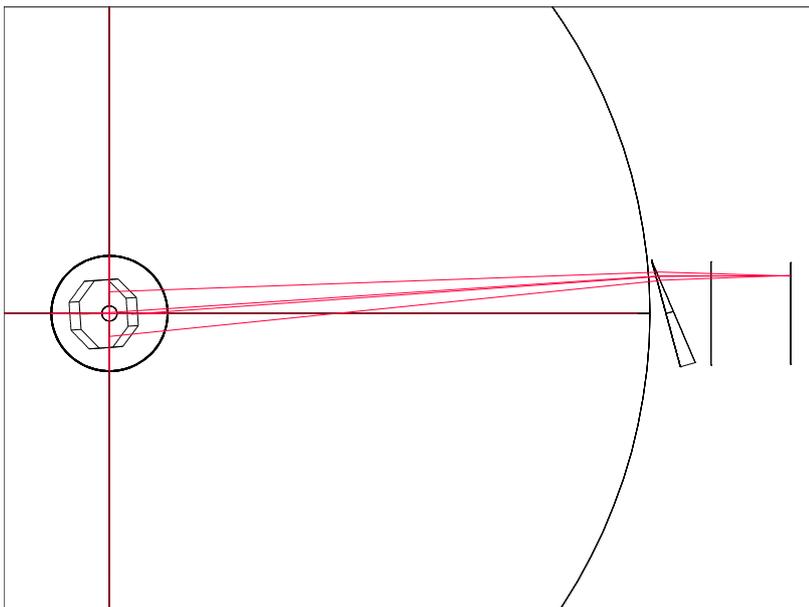


- Transmitted light is tilted 0.04deg toward LBTI and offsetted 1.6mm toward LGSW

- Light incident on the dichroic is perpendicular to the AGW structure and coincident with the rotator axis

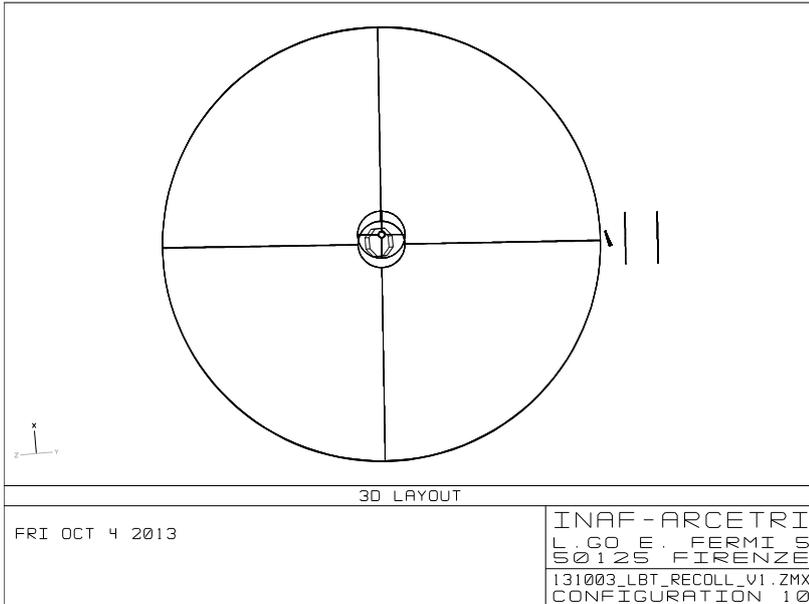
However the alignment strategy for the dichroic and LGSW requires the opposite situation: light transmitted through the dichroic to be coincident with the instrument rotator axis.

Possible solution is to properly adjust the telescope fore optics to modify the input/output beams from the dichroic:



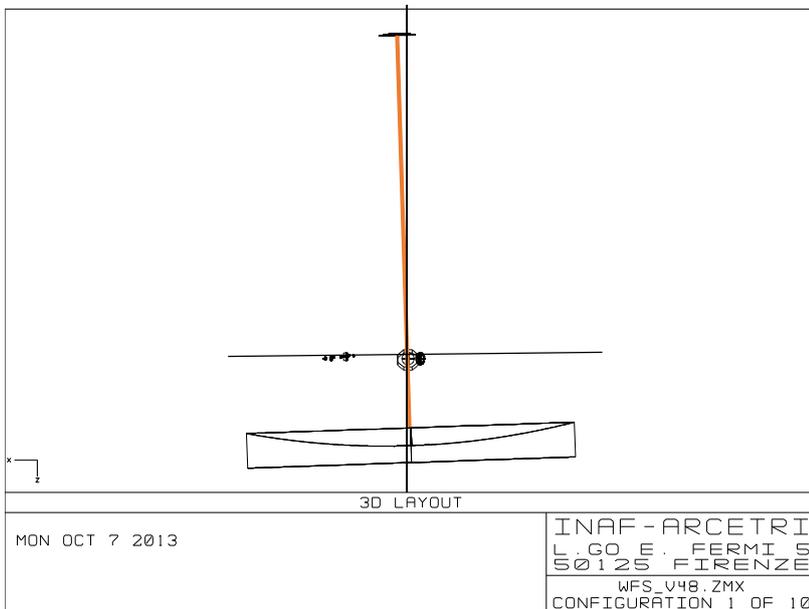
- Acting on M3 selection angle is possible to steer the input beam by 0.04deg, having an output beam parallel to the rotator axis

M3 selection angle adjustment (exaggerated 100 times)



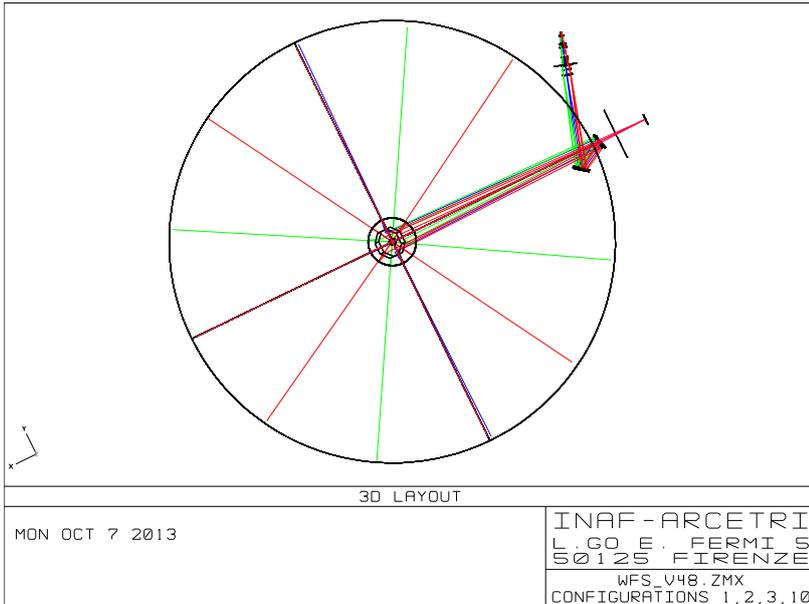
- Acting on the telescope pointing is possible to set back the on-axis beam onto the rotator axis.

M1-M2 rotation around M3 center = telescope pointing offset (exaggerated 100 times).

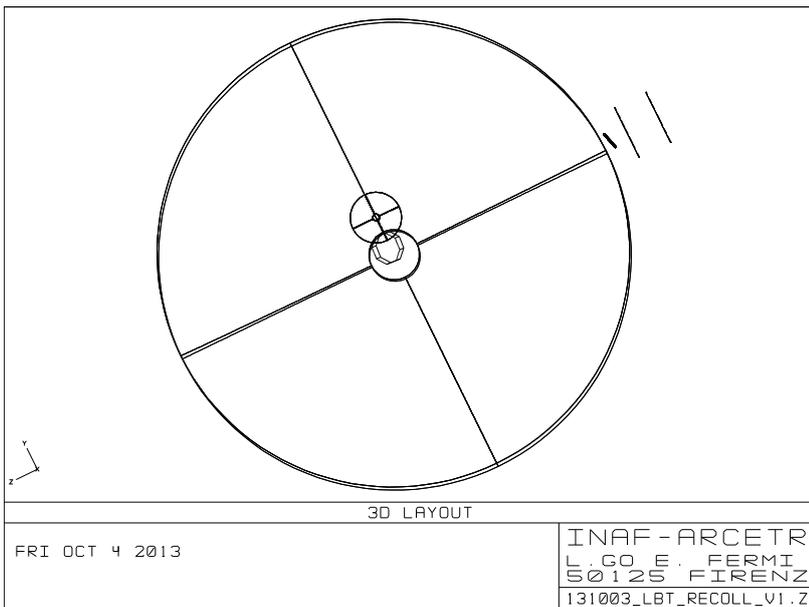


Optimizing these 2 degrees of freedom in Zemax we obtained:

- M3 selection angle: 0.07deg towards LGSW side
- Telescope pointing offset: 3.3mdeg (12'') in the N/S direction with respect the LUCI rotator axis, (directed towards horizon in figure).



To transform the pointing offset in elevation-rotation coordinates it is necessary to consider the orientation of the LUCI rotator axis with respect the elevation structure (26deg).

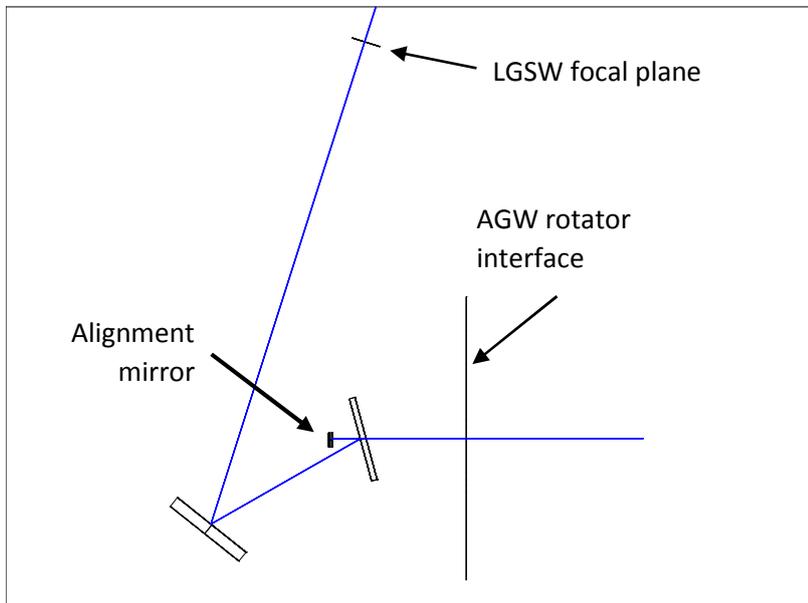


- Elevation offset: $12'' \cos(26\text{deg}) = 10.8''$ towards horizon

- Rotation offset: $12'' \sin(26\text{deg}) = 5.3''$ counter-clockwise for SX side, clockwise for DX side.

OPTICAL ALIGNMENT OF THE ARGOS DICHOIC AND LGSW

The alignment strategy for the ARGOS dichroic and LGSW bases on the assumption that the output beam from the dichroic is coincident with the LUCI rotator axis.



A laser beam can be projected from the FLAO pyramid WFS board, through the ARGOS dichroic and reflected back by a flat mirror.

The mirror should be adjusted in tip-tilt to put the setup in autocollimation.

Part of the laser beam would be reflected by the ARGOS dichroic and fold mirror identifying the LUCI rotator axis on the LGSW bench.

