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CALTECH OPTICAL OBSERVATORIES
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PALAO optical beam heights

Version 1.0

Anna Moore

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Caltech Optical Observatories
California Institute of Technology
Pasadena, CA 91125

Abstract

This document summarizes the measured beam height of a HeNe laser back-propagated through the PALAO system.

Version History

Version	Date	Author	Comments
1.0	2007-08-02	AMo	

Contributing Authors

Rick Burrus

Jeff Hickey

Chris Shelton

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1 Introduction

Please abide by Word formatting rules when editing this document, in particular, use only the provided styles (there are 35).

Dimensions given without units are in SI (millimeter) format.

1.1 Overview

A HeNe laser was used to measure the beam height at every optic in the PALAO system excluding the difficult-to-access wavefront sensor path. All measurements were taken on June 26th2006 inside the AO lab of the Hale 200" dome at Palomar with the PALAO optical bench orientated at an equivalent zenith position.

1.2 Scope

1.3 Reference documents

[1] PALAO design specifications (Dekany *et al*., 1998, SPIE, **3353**, 56)

1.4 Reference links

PALAO (JPL): http://ao.jpl.nasa.gov/Palao/PalaoIndex.html

PALAO (COO): http://www.astro.caltech.edu/palomar/AO/

1.5 Acronyms

PALAO Palomar Adaptive Optics system

2 Summary

2.1 Set-up

The set-up procedure was as follows:

1. The PALAO bench was placed on the AO spit and PHARO was removed (giving access to the focus location);
2. The PALAO bench, supported on the AO spit, was rotated to the equivalent of zenith position;

3. The white light source in the STIMULUS unit was used to acquire AO lock;
4. The location of the white light spot in the X/Y plane of the STIMULUS unit was noted;
5. The fold mirror reflecting the white light source was retracted to allow access to the optical axis of the PALAO system (shown in Figure 1);
6. The HeNe laser was placed in the STIMULUS unit and fixed onto a mount;
7. A fold mirror was used to direct the beam down the hole in the PALAO bench such that the laser spot was coincident with the previously marked location of the white light source (shown in Figure 2);
8. The laser and mirror orientation were adjusted until the laser beam was at the centre of the deformable mirror and roughly in the correct location in the field of the acquisition camera;
9. The science focus location was measured;
10. Consecutively the heights of the beam were measured at each optic in the PALAO system excluding any element after the reflection from SSM1. An example is shown in Figure 3. Each height was measured using a calliper as accurately as possible.

2.2 Photos

Figure 1: Setting up of the HeNe laser in the PALAO STIMULUS unit

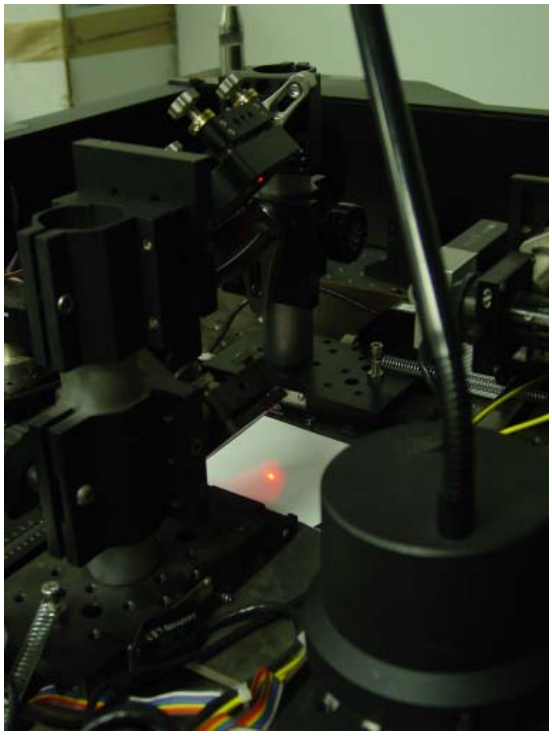

Figure 2: The fold mirror was mounted firmly and the laser was adjusted such that the laser beam was aimed along the optical axis of the PALAO system

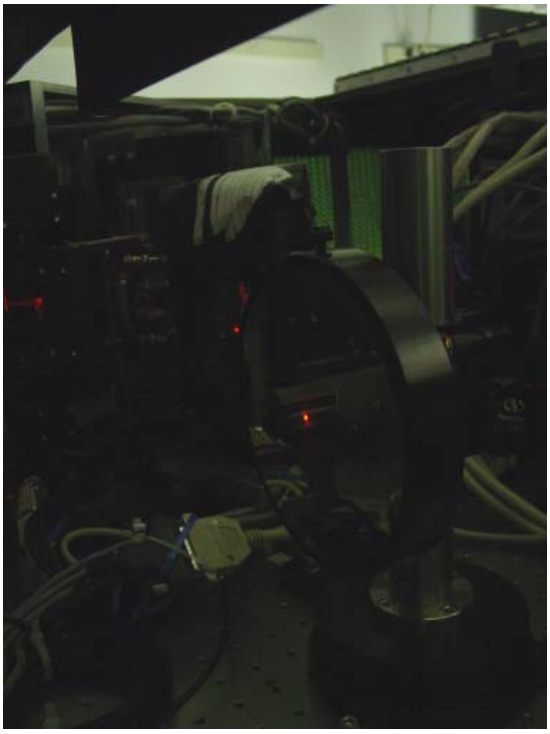

Figure 3: The laser beam on one of the PALAO optical elements represents the optical axis of the system

2.3 Results

The beam heights are summarized in Table 1. Some of the optics were inaccessible directly therefore measurement of the beam height was made as aclose as possible. In these cases the approximate distance to the optic is noted.

Optical Element	Beam height	Comment
FM1	169.9mm (6.69”)	On mirror
OAP1	162.3mm (6.39”)	~4” from mirror
FSM	153.9mm (6.06”)	~2” from mirror
DM	163.1mm (6.42”)	~5” from mirror
FM2	173.7mm (6.84”)	On mirror
OAP2	174.0mm (6.85”)	~5.5” from mirror
SSM1	171.7mm (6.76”)	~2” before SSM1
FM3	166.9mm (6.57”)	~2.5” before
Science focus	171.2mm (6.74”)	On focus
At edge of optical bench	183.1mm (7.21")	Used to measure slope of exiting beam from FM3; on beam

Table 1: Beam heights of the PALAO optics and science focus

2.4 Conclusions

The height of the current PALAO science focus is not the expected 165.16mm (6.5025”), but slightly higher at 171.2mm (6.74”). In addition, there is beam deviation throughout the system of a maximum value of~20mm.