

Compact Adaptive Optics for Demonstration and Basic Research

- ◆ Current needy groups:
 1. Tour groups – basic principles/AO in action
 2. Incoming CfAO researchers with little background in AO
 3. Students in AO class/short courses/summer programs – possible hands-on projects
 4. Research that requires only the bare, inexpensive necessities
 5. Who else?

- ◆ Tools available to the CfAO:
 1. Vision systems (Eric Steinbring) – measure wavefront of eye
 2. Tip/tilt correction system on 10” telescope (bad performance)
 3. Less accessible systems at Livermore, UCSC Optics shops, and Rochester
 4. What else? Where?

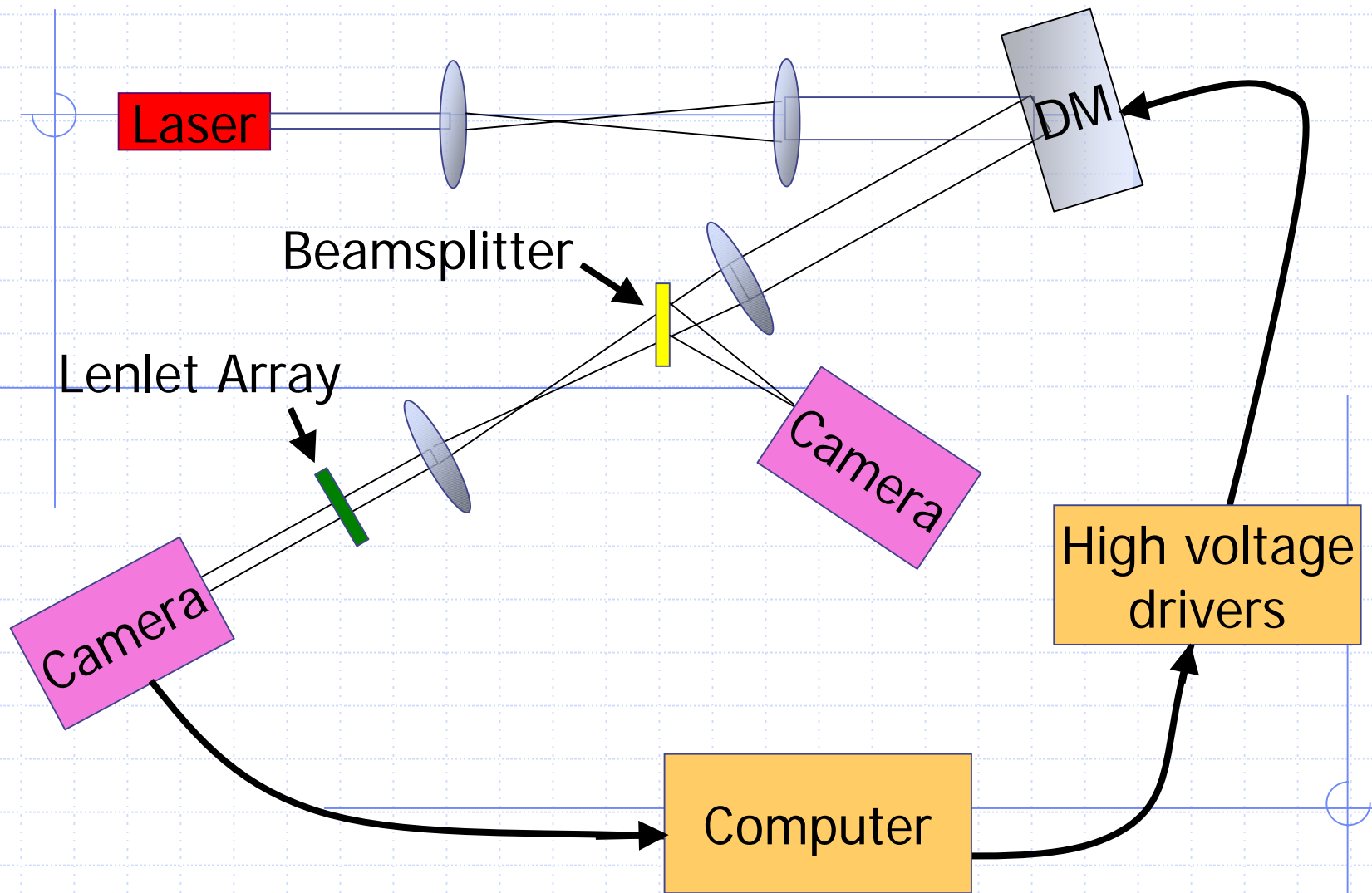
AO Demonstrator – Key concepts

- ◆ Inexpensive – (< \$20k)
- ◆ Compact and easily deployable
- ◆ Cater to wide range of user experience and competence levels
- ◆ Quick and dirty operation possible
- ◆ Visible results, if necessary
- ◆ Interactive (inquiry, possibly?)
- ◆ Robust – operable under changing conditions and optical alignments
- ◆ Modular – software can be changed easily, optics can be traded out

AO Demonstrator – Current Status

- ◆ An AO Demonstrator system is being constructed in the Laboratory for Adaptive Optics (LAO) in Thimann
- ◆ Currently residing on a 2' x 2' optical breadboard – can be placed on a cart
- ◆ Parts are from image-sharpening Intellite system (\$15k) – Deformable mirror, desktop computer, voltage drivers, and camera
- ◆ System has been converted to Shack-Hartmann with purchased components (lenslet array, lenses, input laser, optical mounts, etc.)
- ◆ Currently writing graphical user interface for Shack-Hartmann system

AO Demonstrator – Optical Layout



Levels of Interaction

1. Simple/facilitated – for tour groups. Abberate beam with glass or turbulence and observe corrected results.
2. Complex – for students. Change optical alignment and look for differences in observables like Strehl, bandwidth, etc. Compare Shack-Hartmann to Image sharpening.
3. Complete – for researchers or student projects. Change source code (Visual C++) or add different reconstructors besides pseudo-inverted influence matrices.

Questions

◆ I'm looking for suggestions about the graphical user interface:

1. What do tour groups want to see?
2. What types of projects are students looking for?
What timescales?
3. What else is necessary?

◆ Who else would be interested?

- Don Wiberg & Bing Xu are looking at changing the reconstructor and measuring Strehl
- Possible utility for supporting other LAO work (improving laser quality, quick & dirty tests)

◆ How far from the CfAO can it travel?