NGAO Laser System: design impact of cost savings ideas

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Outline

- Review proposed cost savings ideas
- Design implications
- Discussion

Proposed cost savings ideas

- Community wide common specification for laser
  - Proposal with ESO, et al. for laser
- Mount laser units on telescope elevation ring
- Fewer laser units and less power
- Asterism modifications
- Procure & implement elements of NGAO laser facility early
  - Considering MRI proposal

Astro community laser

- Product not breadboard
- Vendor recovers R/D costs
- Collaborate with ESO, TMT, et al. on laser call for tender
  - 25 W per laser unit (NGAO SD 4 units/100 W)
- Cost savings of reduced risk and schedule delays ($ value ??)
- Features we do not want or need
  - Examples:
    - D2a/D2b back pumping (unproven idea)
    - quasi CW operation (pure CW and pulsed laser advantages)
    - ESO software standards
    - European standards: power, others?
- Costs for NGAO modifications

LGS mounted on elevation ring

- ESO lasers function in varying gravity environment
- Side launch on VLT UT4 (NGAO needs central launch)
- Laser transport does not require tracking
  - Still need flexure compensation and beam steering
- Can we really do this at Keck?
  - Specification 1000 Kg/unit.
  - What is Keck elevation ring mass limit?
  - Cabling and cooling into elevation ring

Purchase fewer lasers

- Reduce laser units from 4 to 3/2
- Reduce total power 100 W to 75-50 W
- Presentation by Dekany for performance implications
- Buy in stages
  - Likely cost will **not** be less in the future (unlike CD's and CPU's)

Asterism modifications

- Presentation by Dekany for performance implications
  - 4 LGS fixed & 3 LGS moving
- Make fewer laser spots
- Fix central asterism + 3 point and shoot spots
- Beam transport and LGS asterism generator can be simplified
- Roving LGS expensive complicated
  - Suggesting that we study two asterisms both fixed
  - Might resemble Flicker's 9c
  - Low power, low order correction/sensing for outer lasers

Early procurement

- Procure & implement the top-end laser launch facility in FY10
- Besides laser units launch telescope is major expense
- Considering MRI proposal
- Install and use on Keck II with current laser
  - Reduces elongation of LGS
- Fix design too early
  - Testing of Keck I LLT at Galileo Avionca last week
    - vignetting minimal over field
    - Wavefront quality acceptable off axis
  - Need to consider interface to multiple laser beams
    - Proposal due in January 2009

Discussion

- Any questions?