

## **NGAO Status**

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## Next Generation AO at Keck

- Nearing completion of 18 months System Design phase
  - <u>Science requirements</u> and initial functional requirements flow-down established
  - Dozens of <u>trades studies</u> conducted to establish performance budgets, identify technical approaches, and assess risks
  - AO system architecture and concept design complete
  - Initial cost estimation task underway
  - TSIP funding identified for Preliminary Design phase
  - System Design Review planned for April 2008



## NGAO cascaded relay optical design



## **SD** Phase Technical Reports

303 Mauna Kea Atmospheric Parameters (CN-M1,M2,M3 models) 414 System Design Phase Systems Engineering Management Plan 415 TMT site monitoring data (restricted access) 416 Atmospheric sodium density from Keck LGS photometry 417 Sodium abundance data from Maui Mesosphere 419 Simple Models for the Prediction of NA LGS Brightness & Comparison to Measured Returns from the Gemini & Keck Lasers 420 Accessing the MK TMT seeing & weather data (restricted access) 427 Variable versus fixed LGS asterism 428 Implications and requirements for Interferometry with NGAO 429 LGS asterism geometry and size 452 MOAO versus MCAO trade study report 455 Science Case Requirements Document v1.0 v2.0 456 System Requirements Document v1.11 v1.13 v1.15 v1.16 459 NGAO System Design Phase Report #1 461 Wavefront Error Budget Predictions & Measured Performance for Current & Upgraded Keck AO 462 NGAO Trade Study: Keck AO Upgrade 463 Lessons learned on LGS operations: weather impact, efficiency and science operations model 465 NGAO LGS wavefront sensor: Type and number of subapertures trade studv 466 Computer Simulations of AO PSFs for NGAO 468 An Algorithm for Reconstruction of Keck Telescope Segment Figures 469 Effect of Keck Segment Figure Errors on Keck AO Performance 470 Keck NGAO sky coverage modeling 471 NGAO Wavefront Error and Ensquared Energy Budgets 472 GLAO for Non-NGAO Instruments 473 NGAO System Design Phase Report #2 474 AO Photometry for NGAO 475 Tomography Codes Comparison and Validation for NGAO 476 Observing Models Trade Study 480 Astrometry for NGAO 481 NGAO System Design Phase Mid-FY07 Replan 482 Keck Telescope Waverfront Error Trade Study 483 Keck Interferometer Support Trade Study 484 Optical Design Practices for NGAO



485 Adaptive Secondary Mirror Trade Study 487 NGAO LOWFS Architecture Trade Study 490 Rayleigh Rejection Trade Study 491 NGAO system performance summary 492 NGAO null-mode and guadratic mode tomography error 493 Science Instrument Reuse Trade Study 494 NGAO System Design Phase Report #3 495 Summary of NGAO Trade Studies 496 Mauna Kea turbulence statistics from the T6 MASS/DIMM at the 13 North site: Update 2 (restricted access) 497 NGAO High-Contrast and Companion Sensitivity Performance Budget 499 NGAO System Architecture Definition 500 Keck AO Upgrade Feasibility 501 NGAO Background and Transmission Budgets (v1.1) 502 Keck AO Upgrade Engineering Costs Basis 503 Mauna Kea Ridge Turbulence Models 504 NGAO Performance vs Technical Field of View for LOWFS Guide Stars 506 Packaging constraints for d-NIRI and LGS WFS's with a note on tip-tilt stability in Split Relay architecture 509 Uplink Compensation Trade Study 510 Preliminary NGAO Technical Risk Evaluation 511 System Design Manual v1.0 512 NGAO System Design Phase Report #4 514 NGAO System Design Phase Report #5 516 NGAO System Design Phase Early-FY08 Replan 529 Optimum Pixel Sampling for Asteroid Companion Studies (draft) 546 System Design Cost Estimation Guidelines 548 NGAO Science Cases Requirements Summary (the Rainbow Chart) (xls) 549 Optical Relay System Design Report 550 System Configurations Spreadsheet 551 Wavefront Sensor System Design Report 552 Atmospheric Profiler System Design Report 553 Real-Time Control System Design Report 554 NGAO\_Passband\_Definitions 555 NGAO to Instruments Interface Definitions