ATST advanced technology solar telescope

ATST Quarterly News

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Haleakala recommended as ATST site

Major eventsover the last year were the recommendation of Haleakala, HI, as the site for ATST, submission of the construction proposal, and the Jeremy Wagner's succession of Jim Oschmann as project manager. The project continues its push towards construction readiness following submission of the construction phase proposal to the National Science Foundation (NSF) on Jan. 8, 2004. During 2004, a town meeting on ATST and talks on other aspects of ATST were held at the AAS/SPD meeting in Denver, at IAU 223 in St. Petersburg, and at the SPIE meeting in Glasgow.

Site Selection *(http://atst.nso.edu/site)*

The board of directors of the Association of Universities for Research in Astronomy (AURA), the NSO's parent corporation, endorsed Haleakala as the primary site for ATST on Jan. 6, 2005. This followed a recommendation made by the ATST Science Working Group during a workshop in Tucson on Oct. 14, 2004, and a resolution by the Solar Observatory Council (SOC), which met in Tucson, Dec. 6-7, 2004, endorsing the recommendation and passing it along to the AURA board.

"The Advanced Technology Solar Telescope will be the world's premier observatory for studying the detailed processes that occur on the Sun," said Dr. William Smith, AURA's president. "It is therefore appropriate that we have chosen a premier site that will host this facility."

The recommendations followed review of a second year of site survey data from Haleakala, Big Bear Lake, CA, and La Palma, Canary Islands. If approved, Haleakala will be developed in conjunction with the University of Hawaii's Institute for Astronomy (IfA), which operates the Mees Solar Observatory (elevation 3,056 m) at the site on Maui, third largest of the Hawaiian Islands. The survey also indicated that La Palma and Big Bear are acceptable alternatives should circumstances make Haleakala unviable.

"Our survey data show that Haleakala provides the most hours of excellent seeing and coronal skies and is the site that will maximize the scientific output of ATST," said Dr. Thomas Rimmele of NSO, the ATST project scientist.

"This site recommendation is a major step forward for ATST," said Stephen Keil, NSO director and ATST project director. "To finalize the site selection, we will consult with NSF. Once we have their endorsement, we will begin environmental impact studies and explore design issues particular to Haleakala."

"We are extremely excited that the Science Working Group has recognized the enormous scientific potential of Haleakala," said Dr. Rolf Peter Kudritzki, director of the IfA. "Haleakala, 'the House of the Sun,' is a truly unique place, from a scientific viewpoint, as well as for its spiritual and cultural value to the Hawaiian people. The University of Hawaii first took interest in Haleakala for solar research in the mid 1950s and built the University's first observatory, the Mees Solar Observatory, in 1964. Having the ATST come to Haleakala would be the next natural step in the evolution of solar research." Kudritzki also announced that the ATST project is moving forward to undertake a joint State/Federal Environmental Impact Statement at Haleakala, and that the ATST project is identified as a potential new facility in the University of Hawaii, Institute for Astronomy's Haleakala Observatory Long Range Development Plan.

Project Management

Project manager Jim Oschmann resigned from the ATST project in July 2004 to accept a position with Ball Aerospace in Boulder, CO.

"Jim has done a very good job working with the team to bring the project to its current status and we have a solid foundation on which to go forward," Keil said in July. "Both NSF and AURA recognize the loss of Jim's talents to the project, they believe the project is in excellent heath and in a strong position for forging ahead. ATST has been fortunate to have Jim as its project manager for the last few years. He quickly took the science requirements and basic telescope ideas to a fully developed concept that could be accurately costed, resulting in a construction proposal to NSF."

Wagner (left) and Oschmann. (NSO/AURA/NSF)

On Dec. 10, 2004, deputy project manager Jeremy Wagner was named as project manager. "After a careful search, the ATST search committee unanimously recommended Jeremy for the ATST PM job," Keil said. "Jeremy has done an excellent job as deputy for the ATST and as acting ATST PM these past several months. He is an excellent choice and will rapidly push the project forward."

Project Engineering *(http://atst.nso.edu/projbook)*

The principal developments have been the redesign of the coudé rotator from two levels to one, and replacing the Gregorian focal position with the Nasmyth focal position. A three-day systems-level design review is planned for March 2005 in Tucson.

1.0 Telescope Assembly: To simplify the interface to the coudé instruments, a new optical arrangement will feed instruments from the center, rather than the outer edge, of the rotator.

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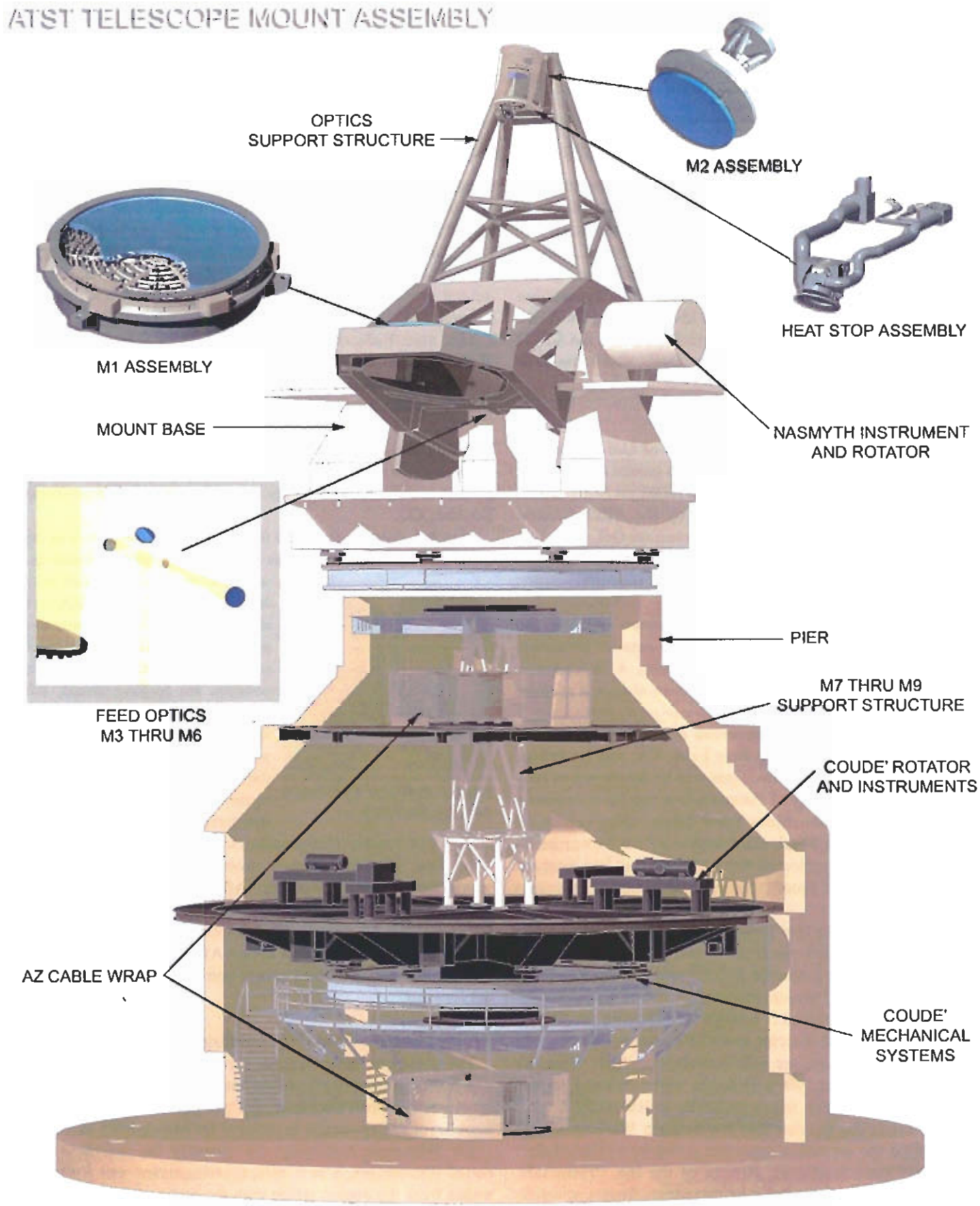
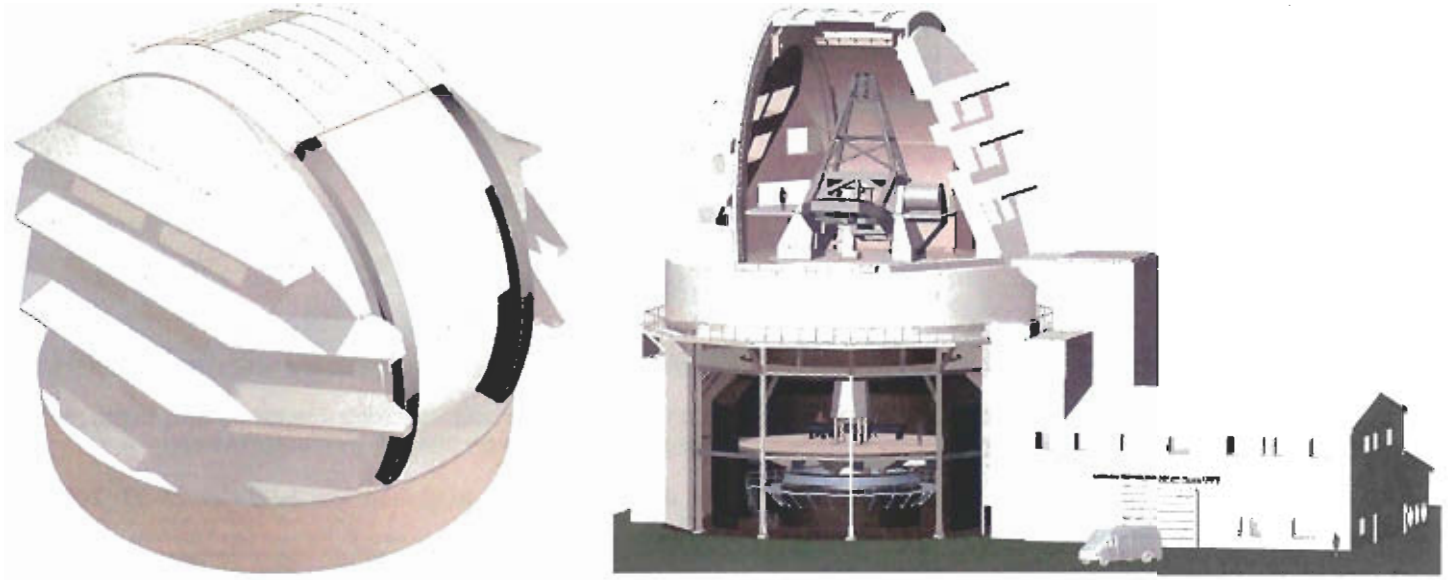


Current engineering concept for ATST. (Mark Warner, NSO/AURA/NSF)



Computer concepts show the current configuration for the hybrid enclosure (left) and the overall facility (right). (Mark Warner, NSO/ AURA/NSF.)

The arrangement has one level with the same lab area as the previous two-level lab. The pier diameter was increased from 12 to 16.3 meters, resulting in better stability for the telescope and longer light paths which minimize beam folding. This also places transfer mirrors at useful conjugate locations for future multi-conjugate adaptive optics (MCAO) upgrades without requiring additional reflections.

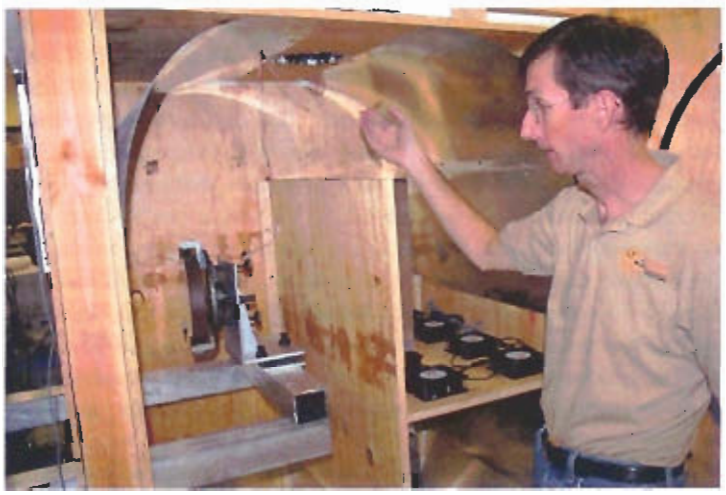
A major issue from the 2003 Conceptual Design Review (CoDR) is the need to control the interface between the typically colder ambient air of the telescope with that of the controlled air in the coudé rotator. Our baseline plan is an air curtain system, now being tested, with series of changeable windows as a fall-back option.

The challenge of providing a mechanical image rotator to the Gregorian focus area has been solved by switching to a Nasmyth focus position in the elevation axle. Using a gravity-stable Nasmyth feed will simplify the design of the instruments.

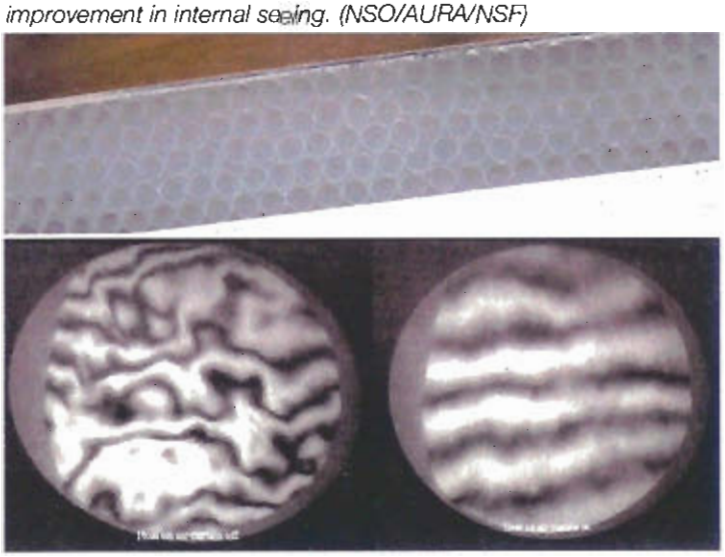
A workshop was held Dec. 10, 2004, covering design changes to the M1 Assembly since the CoDR. These included a more developed thermal control approach for maintaining the optical surface of M1 at ambient temperature, changing the M1 thickness from 100mm to 75mm to improve its thermal response time, and an increase in the number of lateral supports around the edge of M1 from 6 to 24 to improve the optical surface figure at high zenith angles and reduce the amount of active force correction needed.

2.0 Wavefront Correction: Two high-order AO76 systems are available at the Dunn Solar Telescope in Sunspot (the older AO24 was upgraded). Setup and testing have begun on the MCAO system at the Dunn. ATST team members have conferred with Xinetics about supplying a large deformable mirror for ATST.

3.0 Instrument Systems: Cameras now are treated as a suite of instrument systems made available as needed rather than being dedicated to specific instruments. This will provide well-characterized "plug-and-play" cameras for all observers. Instrument reviews were held in Boulder (May 27-28, 2004), covering ATST spectropolarimetry, and Maui (Aug. 11-13, 2004), covering Nasmyth and coudé modules, infrared and visible instruments (including a possible IR descope), polarimetry concerns,



Rob Hubbard (Tucson) shows the interior of the air curtain experimental cabinet assembled at NOAO's Tucson optical shop. At left center is an optical flat to reflect light back into a Zygo interferometer after the light passes through a laminar air curtain formed by air exiting a bank of soda straws (below). The interior of the box simulates the warmer interior of the coudé rotator where M5 and M6 will be located. Preliminary on and off interferograms (bottom) show a marked improvement in internal seeing. (NSO/AURA/NSF)



Rick Dunbar (Sunspot) machines the components of the prototype heat stop assembly to be used in testing. The center view shows the exit cone assembly, depicted at right as a computer drawing with the fast-moving occulter assembly inserted. (NSO/ AURA/NSF.)

observing modes, and ATST calibration.

4.0 High Level Controls/Software: A Telescope Control System workshop was held in November. Design, interface, and operational issues were discussed for all telescope subsystems. Particular concerns were raised about the lack of a fixed guide signal, synchronization of the mount and enclosure, and movement through the zenith blind spot. Preliminary design work will be delivered by the contractor in March 2005. The Observatory Control System design has been extended and now implements both interactive and preplanned observations, and handles complex interactions with the ATST "virtual instrument." Configurations passed between the OCS, VI, and other systems are identified and tracked by an access identifier corresponding to the current experiment and observation. The alpha release of the ATST Common Services continues in development, with the second release candidate to be available in January 2005. This release candidate implements the underlying ICE communications protocol, the ATST containers and components, and the name and event services.

5.0 Enclosure: The dome geometry was optimized to incorporate larger ventilation gates for enhanced thermal control and wind flushing. The nominal dome diameter was also increased from 24 to 26m, to allow better internal access and to provide space for thermal control equipment. Active ventilation fans are now included to draw air across the telescope no low wind days. An enclosure design workshop was held Oct 26-27, 2004, in Tucson.

6.0 Support Facilities/Building: With Haleakala the likely location, attention is turning to optimizing the design for the site, starting the environmental impact statement, and talking with the Air Force about a shared mirror coating facility.

7.0 Remote Operations Building: Work in this area is deferred until details of the observatory are complete.

Recent papers *(http://www.spie.org)*

SPIE Astronomical Telescopes and Instrumentation, June 21-25, 2004, Glasgow. Solar site testing for the Advanced Technology Solar Telescope [5489-11]. Advanced Technology Solar Telescope: conceptual design and status [5489-45]. Results from the solar adaptive optics systems at NSO and BBSO [5490-05]. Solar multiconjugate adaptive optics closed loop at the Dunn Solar Telescope [5490-07]. Performance comparison of several modal reconstructors for high-order solar adaptive optics [5490-61]. Optical setup and design for a solar multiconjugate adaptive optics experimentation at Dunn Solar Telescope/NSO [5490-172]. Optical designs for a Fabry-Perot image interferometer for solar observations [5492-127]. Instrumentation for the Advanced Technology Solar Telescope [5492-29].

Newsletter to be brief, informative

The ATST newsletter will be concise to keep it readable and not get lost in the papers that already sweep your desk. You are getting a paper copy because that's what most readers still prefer. *ATST Quarterly News* will also be on-line at the main page (*http://atst.nso.edu*) with links to details and graphics. Send suggestions to Dave Dooling (*dooling@nso.edu*), the ATST outreach officer.

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