Geophysical Research Abstracts
Vol. 15, EGU2013-6305, 2013
EGU General Assembly 2013

The Advanced Technology Solar Telescope: Science Drivers and Construction Status

Thomas Rimmele (1), Thomas Berger (1), Joseph McMullin (1), Stephen Keil (1), Phil Goode (2), Michael Knoelker (3), Jeff Kuhn (4), Robert Rosner (5), Roberto Casini (3), Haosheng Lin (4), Friedrich Woeger (1), Oskar von der Luehe (6), Alexandra Tritschler (1), and Atst Team ()

(1) AURA Inc., National Solar Observatory, Sunspot, United States (rimmele@nso.edu), (2) New Jersey Institute of Technology, (3) High Altitude Observatory, (4) University of Hawaii, (5) University of Chicago, (6) Kiepenheuer Institute fuer Sonnenphysik

The 4-meter Advance Technology Solar Telescope (ATST) currently under construction on the 3000 meter peak of Haleakala on Maui, Hawaii will be the world's most powerful solar telescope and the leading ground-based resource for studying solar magnetism. The solar atmosphere is permeated by a 'magnetic carpet' that constantly reweaves itself to control solar irradiance and its effects on Earth's climate, the solar wind, and space weather phenomena such as flares and coronal mass ejections. Precise measurement of solar magnetic fields requires a large-aperture solar telescope capable of resolving a few tens of kilometers on the solar surface. With its 4 meter aperture, the ATST will for the first time resolve magnetic structure at the intrinsic scales of plasma convection and turbulence. The ATST's ability to perform accurate and precise spectroscopic and polarimetric measurements of magnetic fields in all layers of the solar atmosphere, including accurate mapping of the elusive coronal magnetic fields, will be transformative in advancing our understanding of the magnetic solar atmosphere. The ATST will utilize the Sun as an important astro- and plasma-physics "laboratory" demonstrating key aspects of omnipresent cosmic magnetic fields. The ATST construction effort is led by the US National Solar Observatory. State-of-the-art instrumentation will be constructed by US and international partner institutions. The technical challenges the ATST is facing are numerous and include the design of the off-axis main telescope, the development of a high order adaptive optics system that delivers a corrected beam to the instrument laboratory, effective handling of the solar heat load on optical and structural elements, and minimizing scattered light to enable observations of the faint corona. The ATST project has transitioned from design and development to its construction phase. The project has awarded design and fabrication contracts for major telescope subsystems. Site construction has commenced following the successful conclusion of the site permitting process. Science goals and construction status of telescope and instrument systems will be discussed.