

India's National Large Solar Telescope

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The National Large Solar Telescope NLST will be a state-of-the-art 2-m class telescope for carrying out high-resolution studies in the solar atmosphere. Recent numerical simulations suggest that crucial physical processes like vortex flow, dissipation of magnetic fields and the generation of MHD waves can occur efficiently over length scales of tens of kilometers. Current telescopes are unable to resolve solar feature to this level at visible wavelengths. NLST will not only achieve good spatial resolution, but will also have a high photon throughput in order to carry out spectropolarimetric observations to accurately measure vector magnetic fields in the solar atmosphere with a good signal to noise ratio.

The main science goals of NLST include: a) Magnetic field generation and the solar cycle; b) Dynamics of magnetized regions; c) Helioseismology; d) Long term variability; e) Energetic phenomena and Activity; and f) Night time astronomy.

The optical design of the telescope is optimized for high optical throughput and uses a minimum number of optical elements. A high order adaptive optics system is integrated as part of the design that works with a modest Fried's parameter of 7-cm to give diffraction limited performance. The telescope will be equipped with a suite of post-focus instruments including a high resolution spectrograph and a polarimeter. NLST will also be used for carrying out stellar observations during the night. The mechanical design of the telescope, building, and the innovative dome takes advantage of the natural air flush which will help to keep the open telescope in temperature equilibrium.

Critical to the successful implementation of NLST is the selection of a site with optimum atmospheric properties, such as the number of sunshine hours and good "seeing" over long periods. A site characterization programme carried over several years have established the existence of suitable sites in the Ladakh region.

After its completion, currently planned for 2015, NLST will fill a gap in longitude between the major solar facilities in the world and will be for years the largest solar telescope in the world.