

Title of Investigation: Community Data Server for the New Solar Telescope in Big Bear

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Program Name: Defense University Research Instrument Program (DURIP)

Proposal Summary

The largest aperture solar telescope in the world, the 1.6 m off-axis New Solar Telescope (NST) has been operating at Big Bear Solar Observatory (BBSO) since 2009. As telescope commissioning ends, we are beginning to see a torrent of data flooding from the suite of new instrumentation on the NST. The unprecedented spatial resolution of the NST, with its state-of-the-art adaptive optics (AO) have revealed many new insights into the nature of our star and the origins of space weather. The instrumentation fed by AO includes visible light and near infrared (NIR) spectro-polarimeters for measuring the Sun's small-scale magnetic field and their evolution on timescales of several seconds. Such hardware is essential for observing the origins and evolution of explosive events on the solar surface like flares and coronal mass ejections (CMEs) that are the origin of space weather events. We can collect data and present it a user friendly way, but what we lack is a data storage facility for the pending avalanche. **Here we propose for a petabyte-scale data storage system to store about two years of raw data from the NST and other NJIT Center for Solar-Terrestrial Research (CSTR) assets in Antarctica, South America, California and New Jersey to support the joint space weather efforts. The CSTR Server will heavily leverage previous AFOSR investment in the NST and its focal plane instrumentation. This server will provide the Air Force, as well as the rest of the interested community, the highest cadence, diffraction limited NST from the deepest photosphere through the base of the corona. These high quality data will benefit precise space weather forecasting, and will be used in many Ph.D. theses.**

The NST will generate about 90% of the CSTR data, and for our studies and for community benefit, we plan to keep two years of raw data online. We have seen that on a summer day, NST instruments can generate about 5 TB (and 1 TB for other days) , and averaged over a typical year we expect about 500 TB, which implies the system capacity needs to be 1000 TB (1 petabyte). Adding another 20% for RAID 5 redundancy, we have 1.2 PB for a system requirement of 4 300 TB disks.

This is a one year project to make purchase a petabyte scale data storage system to reside at BBSO to store high resolution solar data for community use in the study of our dynamical star and its eruptive events. This effort builds on previous AFOSR support.

The requested budget for the project hardware is \$220,000 from the AFOSR DURIP. NJIT will match with \$50,000 to house the storage system in BBSO.

NJIT/BBSO personnel will implement the server at no charge to the project.

CSTR Server System	Unit Price
5 Aberdeen X86 Storage Servers	\$198 K
Quantum Scalar 180 Tape Library	\$14 K
Network Switch, 6 UPS's, 3 Rack Solution 44U's	\$8 K
Grand Total	\$220 K

A more detailed budget will be presented in the proposal.