

Thomas R. Metcalf SPD Travel Award Conference Report

National Solar Observatory Workshop #30 High-resolution Solar Physics: Past, Present, Future

August 7 -11, 2017 | Sunspot, New Mexico

Polarimetry at the photosphere/corona interface: Prospects and challenges

Tom Schad

Invited Oral Presentation given on Monday, August 7th.

Abstract: The light-gathering abilities of new large-aperture facilities, i.e. DKIST, will revolutionize our ability to diagnose magnetic fields of important transitional regimes in the solar atmosphere, in particular those marked by chromospheric temperatures and a reduced plasma-beta. This evolving field has seen great progress in the forward modeling of spectral diagnostics and the measurement and interpretation of very weak polarization signatures. In this the facilities at Sacramento Peak have played an important role. While recognizing the many challenges involved, this talk showcased recent successes at diagnosing transitional plasma magnetic fields and attempts to identify the polarimetric techniques best poised for an early scientific return at DKIST.

Due to the generosity of the SPD Thomas Metcalf Travel Award, I was able to participate in the farewell workshop of the NSO at Sacramento Peak. On this 70th anniversary of solar astronomy on Sac Peak, we reflected upon the great strides made in our field through the dedicated efforts of many individuals who pursued or facilitated research at Sac Peak. The place has touched and inspired many over the years, including countless students. As one of those students, I am eternally grateful for the guidance, experience, and fellowship I enjoyed at Sac Peak.

The workshop's scientific program, organized by Rob Rutten and Steve Keil, focused on the very recent progress made in high-resolution observational and theoretical studies of the solar atmosphere, including those from the *DST*, *SDO*, *IRIS*, and *SST* as well as *MURAM*, *BiFROST*, and others. Diagnosing the chromospheric and coronal magnetic field is a key ingredient threading these efforts despite lacking comprehensive observational constraints. My presentation reviewed recent work to observe and interpret the Hanle Effect on forward-scattered atomic-level polarization of chromospheric spectral lines, and discussed in particular the use of the He I triplet system to map the chromospheric magnetic field and the fine-scaled structure of the catastrophically cooled coronal field. Participation in this workshop solidified the importance of this work and introduced me to a number of other ongoing efforts to pursue similar diagnostics (including numerical codes such as *STiC* and *PORTA*).



Dr. Thomas Schad

As an assistant astronomer for the National Solar Observatory (NSO), Tom primarily pursues diagnostics of the chromospheric and coronal magnetic fields using infrared spectropolarimetric techniques. He is located in Pukalani, Hawaii, and is an active member of the science team for the Daniel K. Inouye Solar Telescope (DKIST). Tom completed his Ph.D. at the University of Arizona under the guidance of Dr. Matt Penn (NSO) in 2013. Afterwards he was the instrument scientist for DL-NIRSP, a DKIST facility instrument. His love of solar astronomy was first cultivated by REU experiences at Montana State University (advised by Richard Canfield) and at the NSO (advised by Steve Keil).