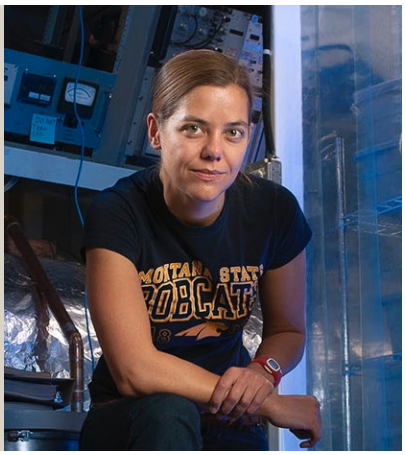
Summary of Involvement for the Thomas Metcalf SPD Travel Award

IAU Symposium 305, Polarimetry: From the Sun to Stars and Stellar Environments – Punta Leona, Costa Rica – Nov 30 - Dec 5, 2014

Sarah A. Jaeggli

Sarah is a post-doctoral researcher on the Interface Region Imaging Spectrograph (IRIS) mission at Montana State University working with Dr. Charles Kankelborg. While she is currently working on molecular and atomic ultraviolet spectroscopy of the solar chromosphere, she is an expert in instrumentation for spectropolarimetry and magnetic diagnostics of the solar atmosphere, and received her Ph.D. in Astronomy in 2011 from the University of Hawaii's Institute for Astronomy working with Dr. Haosheng Lin.



Oral Contribution: The Persistence of Apparent Non-Magnetohydrostatic Equilibrium in NOAA 11035

NOAA 11035 was a highly sheared active region that appeared in December 2009 early in the new activity cycle. The leading polarity sunspot developed a highly unusual feature in its penumbra, an opposite polarity pore with magnetic fields in excess of 3500 Gauss, which persisted for several days during the evolution of the region. This region was well observed by both space- and ground-based observatories, including Hinode, FIRS, TRACE, and SOHO. These observations, which span wavelength and atmospheric regimes, provide a complete picture of this unusual feature.

The inside edge of the pore shows complex polarization signatures in the Fe I 6302 Å and Fe I 15650 Å magnetic diagnostics of the photosphere with an obvious 4 km/s upflow. A Milne-Eddington inversion of the Stokes spectra with two magnetic components indicates that the polarization signature cannot be reproduced by velocity shifted weak fields. A quick calculation indicates that because the region is very small magnetic tension is sufficient to constrain the magnetic pressure without considering gas pressure. The region of the upflow coincides with optically thick structure in the lines of He I 10830 Å and H I 6563 Å.

The high magnetic field strength and high velocity in the photosphere seem to indicate that the pore magnetic field is continuously reconnecting with the surrounding active region magnetic field, lofting dense photospheric material into the chromosphere where the field lines connect above the region, while the magnetic field lines below contract into a dense bundle.

Attendance at this meeting provided the motivation for completing this project. The oral presentation will be rapidly developed into a journal article. In addition, Sarah served as the chair for the session on Instrumentation for Astronomical Polarimetry, and the meeting also provided continuing contact with Haosheng Lin.