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Degrees:

Ph.D. (Astronomy) University of Hawai'i, May 1995.
Dissertation: "Are Solar Emerging Active Regions Carrying Electric Current?"
M.S. (Astronomy) University of Hawai'i, May 1992.
B.S. (Astronomy and Physics) Yale University, June 1989.

Professional Associations:

American Astronomical Society (AAS)
Solar Physics Division of the AAS
International Astronomical Union (IAU)
Sigma Xi Scientific Research Society

Appointments:

Senior Research Scientist, Colorado Research Associates Division, NorthWest Research Associates, July 2003 – present.
Research Scientist, Colorado Research Associates Division, NorthWest Research Associates, June 1998-June 2003.
Research Associate, National Research Council, at the Space Environment Center/NOAA, May 1997-May 1998.
Postdoctoral Fellow, Advanced Study Program, National Center for Atmospheric Research, December 1994-April 1997.
Research Assistant and Yohkoh Soft X-ray Telescope ground-based support team member under Dr. Richard C. Canfield, University of Hawai'i Institute for Astronomy and Mees Solar Observatory, 1991 – December 1994.
Lecturer, University of Hawai'i College of Continuing Education, Honolulu, Spring, 1992.
Research Assistant under Dr. Richard C. Canfield, University of Hawai'i Institute for Astronomy, Honolulu, 1989 - 1991.
Research Assistant under Dr. George Herbig, University of Hawai'i Institute for Astronomy, Honolulu, Summer, 1990.
Summer Research Associate, National Solar Observatory, Sacramento Peak Observatory, New Mexico, 1988.

General Research Interests:

Solar Active Region Structure and Evolution: observations of the magnetic field and thermodynamics during sunspot development, evolution, and decay; understanding sunspot and active region structure in 3-D, from below the photosphere through the visible layers and into the chromosphere and corona.
Solar flares: understanding their cause physically, and designing research for forecasting efforts. in the solar atmosphere
Vector magnetograph and imaging spectrograph development and calibration.

Funding Accomplishments as Principle Investigator

"Collaborative Research: Driving Solar MHD Simulations with Vector Magnetogram Sequences", K. D. Leka (P.I.) and Tom Metcalf (Co-I), to NSF-SHINE; 3 years, $287,820 awarded 2006.

"Can the Kink Instability Trigger Solar Energetic Events?", K. D. Leka (P.I.) with Graham Barnes (Co-I), to NSF-NSWP; 3 years, $275,231, awarded 2005.

"Resolving the 180° Azimuthal Ambiguity in Solar Vector Magnetic Field Measurements", K. D. Leka (P.I.), Graham Barnes and Tom Metcalf (Co-Is), to NASA/LWS TR&T; 3 years, $389k awarded 2004.

"Applying New Methods to Flare Prediction II: Realization of Methods for Photospheric Vector Magnetic Field Data and their Extension into the Chromosphere", K.D. Leka (P.I.), Graham Barnes and Tom Metcalf (Co-Is), to AFOSR; 3 years, $468k awarded 2003.

"Sunspot Evolution: The Photosphere's Changes and the Corona's Response", K.D. Leka (P.I.), to NASA; 2 years, $175k, awarded 2000.

"Applying New Methods to Flare Prediction Using Photospheric Vector Magnetic Field Data", K. D. Leka (P.I.), Dana Longcope (Co-I) to AFOSR; 3 years, $336k awarded 2000.

"The Structure and Cause of Sunspote Penumbrae Investigated using High-Resolution Spectropolarimetry", K.D. Leka (P.I.) to the NSF; 3 years, $252k awarded 1998.

Additional Research Activities:

"Porting and Maintenance of Existing Code to the HMI Pipeline-6 mo extension", with Tom Metcalf, funding from Stanford/NASA.

"Predicting Flare Properties Using the Minimum Current Corona Model Energetic Events", Co-I with Graham Barnes (P.I.) at NWRA/CoRA; funding from AFOSR.

"Distinguishing Reconnection Scenarios for Solar Energetic Events", Co-I with Graham Barnes (P.I.) at NWRA/CoRA; funding from NSF/SHINE.

"The Emergence of Twisted Magnetic Flux into Pre-existing Coronal Structures", Co-I with S. Gibson (P.I.) and Y. Fan (Co-I) at HAO/NCAR; funding from AFOSR.

"Observations of the Magnetic Free Energy in Active Regions: The Energization of CMEs and Flares", Co-I with Tom Metcalf (P.I.); funding from NASA/LWS.

Comparison of photospheric Fe-line, chromospheric Mg-b line, and chromospheric Na D-line polarimetric data. Collaborators include T. Metcalf, B. Lites (NCAR/HAO), H. Uitenbroek (NSO).

Recent Community Service:

Chair, User's Committee of the National Solar Observatories, 2005–present

Panelist for "Solar Week" on-line forum for science students, 2002–present

Judge, Boulder Valley Regional Science Fairs, 1998–present.

User's Committee of the National Solar Observatories (1997–2005).

Peer referee for manuscripts submitted to *The Astrophysical Journal*, *The Astronomical Journal*, *Astronomy & Astrophysics*, *Solar Physics*, and *Advances in Space Research*, 1995 – present.

Peer reviewer for proposals and white-papers submitted to NASA, NSF, AFOSR, and foreign funding agencies, 1995 – present.

Science Definition Team, NASA Solar Dynamics Observatory Mission (2000-2001).

Elected Council Member of the Solar Physics Division/ American Astronomical Society (2000-2002).

Recent Invited Talks and Presentations:

Invited Presentation, ATST Special meeting: 'Solar Magnetism in the ATST Era', "The Present State of Algorithms for resolving the 180° ambiguity in Solar Vector Magnetic Field Measurements", October 2006.

Invited Talk, General Assembly of the International Astronomical Union, "Observations Of The Chromospheric Magnetic Field In Solar Active Regions", August 2006.

Invited Colloquium, University of Colorado/PASP, "Are We There Yet? The Journey to Understand and Predict Solar Energetic Events", October 2005.

Invited Seminar, NOAA/Space Environment Center, "Upcoming Sources of Vector Magnetic Field Data for Space Weather Forcasting", October 2005.

Invited Presentation, American Geophysical Union, "Chromospheric Vector Magnetic Field Measurements of Active Regions", May 2005.

Invited Presentation, SHINE Workshop, "Photospheric *vs.* Chromospheric Magnetic Field Measurements", July 2004.

Seminar at NOAA/Space Environment Center, "What Makes a Solar Flare? What the Solar Photospheric Magnetic Field Can Tell You, and What Statistics Can't", September 2004

Colloquium, High Altitude Observatory/NCAR, "What Makes a Solar Flare? Determining the Photospheric Magnetic Signature of a Flaring Active Region.", December 2003.

Invited Presentation, SHINE Workshop, "Applying Magnetic Field Data to Real Problems", July 2003.

Colloquium, U. Montreal Physics Department, "Are we There Yet? The Drive to Understand and Predict Solar Energetic Events", March 2003

Seminar at NOAA/Space Environment Center "Are We There Yet? The Drive to Understand and Predict Solar Energetic Events", April 2002.

Colloquium, U. Hawai'i Institute for Astronomy, "The Roots of Change: Understanding the Magnetic Drivers of Solar Variability", December 2001.

Seminar, U. New Hampshire Physics Dept., "The Roots of Change: Solar Magnetic Structures as Drivers of Solar Variability, November 2001.

Invited Presentation on the potential value of vector magnetic field observing capability, "Planning Workshop for GOES-R", NOAA/SEC, October 2001.

Invited Presentation, 'Beyond Solar-B' Science Workshop at NASA/MSFC, "Emerging and Disappearing Magnetic Flux: Recent Progress and Prospects", April 2001.

Skills:

Computer: IDL, Unix, Linux, C, HTML, TeX/LaTeX, StarOffice

Data Acquisition, Reduction, and Interpretation:

Image restoration, spectroscopic analysis techniques; inversion methods and ambiguity-resolution algorithms for polarimetric data. Dr. Leka has observed with and published results from more than a dozen different ground-based and space-based instruments.

Languages: English (native); conversant in French; some Russian, Italian, Japanese, German.

Other: Award-winning chocolate chef.

Publications:
Refereed Journals

Leka, K. D. and Barnes, G. 2007, "Photospheric Magnetic Field Properties of Flaring vs. Flare-Quiet Active Regions IV: A Statistically Significant Sample", *Astrophys. J.* **656**, in press.

Barnes, G. and Leka, K. D. 2006, "Photospheric Magnetic Field Properties of Flaring vs. Flare-Quiet Active Regions III: Magnetic Charge Topology Models", *Astrophys. J.* **636**, 1303

Metcalf, T. R., Leka, K. D., Barnes, G., Lites, B.W. *and 11 co-authors*, 2006, "An Overview of Existing Algorithms for Resolving the 180° Ambiguity in Vector Magnetic Fields: Quantitative Tests with Synthetic Data",*Solar Phys.* **237**, 267-296.

Barnes, G., Leka, K. D. and Wheatland, M. S. 2006, "Quantifying the Performance of Force-free Extrapolation Methods Using Known Solutions", *Astrophys. J.* **641**, 1188

Barnes, G., Longcope, D. and Leka, K.D. 2005, "Implementing a Magnetic Charge Topology Model for Solar Active Regions", *Astrophys. J.* **629**, 561.

Leka, K.D., Fan, Y. and Barnes, G. 2005, "On the Availability of Sufficient Twist to Trigger the Kink Instability", *Astrophys. J.* **626**, 1091

Metcalf, T. R., Leka, K. D., and Mickey, D. L. 2005, "Magnetic Free Energy in AR10486 on October 29, 2003", *Astrophys. J. Letters* **623 #1**, L53

Leka, K. D. and Barnes, G. 2003, "Photospheric Magnetic Field Properties of Flaring vs. Flare-Quiet Active Regions II: Discrminant Analysis", *Astrophys. J.* **595, #2**, 1296

Leka, K. D. and Barnes, G. 2003, "Photospheric Magnetic Field Properties of Flaring vs. Flare-Quiet Active Regions I: Data, General Approach, and Sample Results", *Astrophys. J.* **595, #2**, 1277

Leka, K. D. and Metcalf, T. R. 2003, "Active Region Magnetic Structure Observed in the Photosphere and Chromosphere", *Solar Phys.* **212**, 361–378.

Bleybel, A., Amari, T., van Driel-Gesztelyi, L., Leka, K. D. 2002, "Global budget for an eruptive active region . I. Equilibrium reconstruction approach", *Astron. Astrophys.* **395**, 685B.

Leka, K. D. and Rangarajan, K. E. 2001, "Effects of 'Seeing' on Vector Magnetograph Measurements", *Solar Phys.* **203, No. 2**, 239–254.

Leka, K. D. and Steiner, O. 2001, "Understanding Small Solar Magnetic Elements: Comparing Numerical Models to Observations", *Astrophys. J.* **552**, 354.

Leka, K. D. 1999, "On the value of α from Vector Magnetograph Data II: Spatial Resolution, Field-of-View, and Validity", *Solar Phys.* **188**, 21–40.

Leka, K. D. and Skumanich, A. 1999, "On the value of α from Vector Magnetograph Data I: Methods, Error, and Caveats", *Solar Phys.* **188**, 3–19.

Mickey, D. L., LaBonte, B. J., and Leka, K. D., 1999, "The Imaging Vector Magnetograph at Haleakalā II: Reconstruction of Stokes Spectra", *Solar Phys.* **189**, 1–24.

Leka, K. D. and Skumanich, A., 1998, "The Evolution of Pores and the Development of Penumbrae", *Astrophys. J.* **507**, 454.

Leka, K. D., 1997, "The Vector Magnetic Fields and Thermodynamics of Sunspot Light Bridges: The Case for Field-Free Disruptions in Sunspots" *Astrophys. J.* **484**, 900.

Nitta, N., van Driel-Gesztelyi, L., Leka, K. D. and Shibata, K., 1996, "Emerging flux and flares in NOAA 7260",*Adv. Space Res.* **17**, No. 201.

Mickey, D. L., Canfield, R.C., LaBonte, B. J., Leka, K. D., Waterson, M. F., and Weber, H. M., 1996, "The Imaging Vector Magnetograph at Haleakalā", *Solar Phys.* **168**, 229.

Canfield, R., Reardon, K., Leka, K. D., Shibata, K., Yokoyama, T., Shimojo, M., 1996, "H-alpha Surges and X-ray Jets in AR7260", *Astrophys. J.* **464**, 1016.

Lites, B. W., Leka, K. D., Skumanich, A., Martinez Pillet, V., and Shimizu, T., 1996, "Small-Scale Horizontal Magnetic Fields in the Solar Photosphere", *Astrophys. J.* **460**, 1019.

Leka, K. D., Canfield, R. C., McClymont, A. N., and van Driel-Gesztelyi, L., 1996, "Evidence for Current-Carrying Emerging Flux", *Astrophys. J.* **462**, 547.

Shibasaki, K., Enome, S., Nakajima, H., Nishino, M., Takano, T., Hanaoka, Y., Torii, C., Sekiguchi, H., Kawashima, S., Bushimata, T., Shinohara, N., Koshiishi, H., Shiomi, Y., Irimajiri, Y., Leka, K. D., and Canfield, R. C., 1994, "A Purely Polarized S-Component at 17 GHz", *Pub. Astron. Soc. Japan* **46**, L17.

Leka, K. D., van Driel-Gesztelyi, L., Nitta, N., Canfield, R. C., Mickey, D. L., Sakurai, T. and Ichimoto, K., 1994, "The Magnetic Evolution of the Activity Complex AR7260: A Roadmap", *Solar Phys.* **155**, 301.

Canfield, R. C., de La Beaujardière, J.-F., Fan, Y., Leka, K. D., McClymont, A. N., Metcalf, T., Mickey, D. L, Wülser, J.-P. and Lites, B.W., 1993, "The Morphology of Flare Phenomena, Magnetic Fields, and Electric Currents in Active Regions I. Introduction and Methods", *Astrophys. J.* **411**, 362.

Leka, K. D., Canfield, R. C., McClymont, A. N., Fan, Y., and de La Beaujardière, J. -F., 1993, "The Morphology of Flare Phenomena, Magnetic Fields, and Electric Currents in Active Regions II. AR 5747, October 1989", *Astrophys. J.* **411**, 370.

de La Beaujardière, J.-F., Canfield, R. C., Leka, K. D., 1993, "The Morphology of Flare Phenomena, Magnetic Fields, and Electric Currents in Active Regions III. AR 6350, August 1990", *Astrophys. J.* **411**, 378.

Canfield, R. C., Hudson, H. S., Leka, K. D., Mickey, D. L., Metcalf, T. R., Wülser, J.-P., Acton, L. W., Strong, K. T., Kosugi, T., Sakao, T., Tsuneta, S., and Culhane, J. L., Phillips, A., and Fludra, A., 1992, "The X Flare of 15 November, 1991: Coordinated Mees/Yohkoh Observations", *Pub. Astron. Soc. Japan* **44**, L111.

Wang, H., Varsik, J., Zirin, H., Canfield, R.C., Leka, K. D., and Wang, J., 1992, "Joint Vector Magnetogram Observations at BBSO, Huairou Station and Mees Solar Observatory", *Solar Phys.* **142**, 11.

Herbig, G. H., Leka, K. D., 1991, "The Diffuse Interstellar Bands VIII: New Diffuse Features between 6000 and 8600Å", *Astrophys. J.* **382**, 193.