

Curriculum Vitae: Wei LIU

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Education

Ph.D. in Physics, Stanford University, Stanford, California 01/2007
Dissertation: *Characteristics of Solar Flare Hard X-ray Emissions: Observations and Models*
Reading Committee: Profs. Vahé Petrosian (adviser), Philip H. Scherrer, and Peter A. Sturrock

M.S. in Space Physics, University of Science and Technology of China, Hefei, Anhui, China 06/2000
Thesis: *Solar Prominence Disturbances Associated with Photospheric Magnetic Flux Emergence and Cancellation: a Magnetohydrodynamic Simulation Study*; Adviser: Prof. Y. Q. Hu

B.S. in Space Physics, University of Science and Technology of China, Hefei, Anhui, China 07/1997

Principal/Co-Investigator Awards

NASA Living with a Star Targeted Research and Technology (TR&T) Program 2014 – 2017
Science Analysis for the Solar Dynamics Observatory (SDO) Initiative, “Using EUV Waves to Probe the Solar Corona”, Role: Co-I (PI: Dr. Cooper Downs)

NASA Living with a Star TR&T Program 2013 – 2016
Focused Science Topic: Flare Dynamics in the Lower Solar Atmosphere, “Coupling of Particle Acceleration and Atmospheric Response Processes in Solar Flares: Combined Kinetic-fluid Modeling and Comparison with Multiwavelength Observations”, Role: Co-I, initiated and formed the team, wrote $\frac{3}{4}$ of the proposal (PI: Prof. Vahé Petrosian)

NASA Fermi Guest Investigator Program 2012 – 2014
“Testing Acceleration, Transport and Radiation in Fermi-LAT Detected Solar Flares”,
Role: Co-I (PI: Prof. Vahé Petrosian)

NASA Living with a Star TR&T Program 2011 – 2014
Science Analysis for the Solar Dynamics Observatory (SDO), “Probing Coronal EUV Waves and Wave-like Phenomena: SDO/AIA Data Analysis and MHD Modeling”, Role: Science PI (PI: Prof. Philip H. Scherrer)

Work Experience

Research Associate 02/2009 – present
Stanford-Lockheed Institute for Space Research, Stanford University, Stanford, California

- Coronal EUV waves, flares, jets, condensation in prominences/coronal cavities, sun-grazing comets
- Tera-byte EUV/optical data from *Solar Dynamics Observatory (SDO)/AIA, Hinode/SOT*

NASA Postdoctoral Program (NRC) Fellow 01/2007 – 01/2009
RHESSI group, Solar Physics Laboratory, NASA Goddard Space Flight Center, Greenbelt, Maryland

- New evidence of magnetic reconnection in flares, asymmetric X-ray footpoints and magnetic mirroring
- Soft and hard X-ray data from *Reuven Ramaty High Energy Solar Spectroscopic Imager (RHESSI)*

Research Assistant 06/2002 – 12/2006
Prof. Vahé Petrosian Group, Department of Physics, Stanford University, Stanford, California

- Modeling solar flares with hybrid particle and fluid simulation, stochastic particle acceleration
- New type of hard X-rays at flare loop legs, direct imaging of chromospheric evaporation by *RHESSI*

- Resident Observer* 09/2002 – 01/2003
 Wilcox Solar Observatory (WSO), Stanford University, Stanford, California
- Daily telescope operation to observe solar magnetic fields
- Research Assistant* 06/2000 – 06/2002
 Prof. Philip Scherrer Solar Physics Group, Hansen Experimental Physics Lab, Stanford University, California
- MHD simulation and phenomenological modeling of coronal mass ejections (CMEs)
 - Wavelet analysis of *SOHO*/MDI magnetograms

Teaching and Outreach Experience

Teaching

- Teaching Assistant & Lab Instructor, “Electricity & Magnetism Laboratory”* 03/2005 – 06/2005
 Department of Physics, Stanford University (Prof. Douglas Osheroff, 12 hours/week)
- Oversaw laboratory, set up and tested lab instruments
 - Lectured lab classes, assisted students with lab work, evaluated lab reports
- Teaching Assistant & Section Leader* 09/2001 – 08/2006
 Department of Physics, Stanford University, Stanford, CA
- Led discussion sections, lectured review sessions (100+ students)
 - Held office hours, graded homework and exams
- Courses taught (10 – 12 hours/week, total 7 quarters):
- Statistical Mechanics (graduate level, Prof. Alexander Fetter), Spring 2006
 - Nature of the Universe (Prof. Masao Sako, now at Univ. Penn.), Summer 2005; Winter & Summer 2006
 - Light & Heat (Prof. Peter F. Michelson), Fall 2005
 - Electricity & Optics (Prof. H. Alan Schwettman), Winter 2003
 - Mechanics & Heat (Prof. Andrei Linde), Fall 2001
- Teaching Assistant, “Numerical Methods for Scientific Computation”* 09/1999 – 01/2000
 Department of Mathematics, University of Science and Technology of China, Hefei, Anhui, China
- Graded homework and led office hours

Advising

- Summer Intern Adviser* 05/2008 – 08/2008
 Solar Physics Laboratory, NASA Goddard Space Flight Center
- Advised college student Shea H. Webber (now pursuing PhD at George Mason University) analyzing *RHESSI* data of solar flares
- Adviser, Mathematical Contest in Modeling Team* 09/1999 – 02/2000
 University of Science and Technology of China, Hefei, Anhui, China
- Guided students to construct mathematical models to solve highly competitive, real-world problems
 - Promoted critical-thinking skills, fostered teamwork, and advised scientific writing

Outreach

- Volunteer*, Bay Area Project ASTRO, San Jose, CA; brought astronomy to classrooms 08/2013 – present
- Volunteer*, Exploration Station at the AGU fall meeting, San Francisco, CA 12/2013
- Volunteer*, NASA at the Smithsonian Folklife Festival, Washington, DC 07/2008

Publications**# of Citations****Refereed Journals: First-authored**

(Total: 376)

18. **Liu, W.**, Ofman, L., Schrijver, C. J., Title, A. M. “Counter-Propagating Quasi-periodic Wave Trains in Transequatorial Loops Between Sympathetic Flares”, 2013, *ApJ*, to be submitted
17. **Liu, W.**, Ofman, L., Nitta, N. V., Schrijver, C. J. “Transmission of a Global EUV Wave Into an Active Region and Its Apparent Reflection Due to a Sympathetic Eruption”, 2013, *ApJ Letters*, to be submitted
16. **Liu, W.**, Ofman, L., Downs, C., Title, A. M. “On the Relationship Between Quasi-periodic Wave Trains Inside and Outside a CME Bubble”, 2013, *ApJ*, to be submitted
15. **Liu, W.**, Ofman, L. “Advances in Coronal EUV Wave Observations in the *SDO* Era and Their Seismological Implications (*Invited Review*)”, 2013, *Solar Physics*, submitted
14. **Liu, W.**, Chen, Q. R., Petrosian, V. “Plasmoid Ejections and Loop Contractions in an Eruptive M7.7 Solar Flare: Evidence of Particle Acceleration and Heating in Magnetic Reconnection Outflows”, 2013, *ApJ*, 767, 168, 18 pp. 6
13. **Liu, W.**, Ofman, L., Nitta, N. V., Aschwanden, M. J., Schrijver, C. J., Title, A. M., Tarbell, T. D. “Quasi-periodic Fast-mode Wave Trains Within a Global EUV Wave and Sequential Transverse Oscillations Detected by *SDO/AIA*”, 2012, *ApJ*, 753, 52, 17 pp. 23
12. **Liu, W.**, Berger, T. E., Low, B. C. “First *SDO/AIA* Observation of Solar Prominence Formation Following an Eruption: Magnetic Dips and Sustained Condensation and Drainage”, 2012, *ApJ Letters*, 745, L21, 8 pp. 12
11. **Liu, W.**, Title, A. M., Zhao, J., Ofman, L., Schrijver, C. J., Aschwanden, M. J., De Pontieu, B., Tarbell, T. D. “Direct Imaging of Quasi-periodic Fast Propagating Waves of ~2000 km/s in the Low Solar Corona by the *Solar Dynamics Observatory* Atmospheric Imaging Assembly”, 2011, *ApJ Letters*, 736, L13, 6 pp. **AAS/SPD Press Release**, Las Cruces, NM, 06/2011; Media coverage: [Phys.Org](#), [Astronomy Now](#), [Fox News](#), etc. 27
10. **Liu, W.**, Berger, T. E., Title, A. M., Tarbell, T. D., Low, B. C. “Chromospheric Jet and Growing ‘Loop’ Observed by *Hinode*: New Evidence of Fan-Spine Magnetic Topology Resulting From Flux Emergence”, 2011, *ApJ*, 728, 103, 16 pp. 22
9. **Liu, W.**, Nitta, N. V., Schrijver, C. J., Title, A. M., Tarbell, T. D. “First *SDO AIA* Observations of a Global Coronal EUV Wave: Multiple Components and Ripples”, 2010, *ApJ Letters*, 723, L53-59 55
8. **Liu, W.**, Berger, T. E., Title, A. M., Tarbell, T. D. “An Intriguing Chromospheric Jet Observed by *Hinode*: Fine Structure Kinematics and Evidence of Unwinding Twists”, 2009, *ApJ Letters*, 707, L37-L41 30
7. **Liu, W.**, Petrosian, V., Mariska, J. T. “Combined Modeling of Acceleration, Transport, and Hydrodynamic Response in Solar Flares: I. The Numerical Model”, 2009, *ApJ*, 702, 1553-1566 16
6. **Liu, W.**, Wang, T. J., Dennis, B. R., Holman, G. D. “Episodic X-Ray Emission Accompanying the Activation of an Eruptive Prominence: Evidence of Episodic Magnetic Reconnection”, 2009, *ApJ*, 698, 632-640 12
5. **Liu, W.**, Petrosian, V., Dennis, B. R., Holman, G. D. “Conjugate Hard X-ray Footpoints in the 2003 October 29 X10 Flare: Unshearing Motions, Correlations, and Asymmetries”, 2009, *ApJ*, 693, 847-867 30
4. **Liu, W.**, Petrosian, V., Jiang, Y. W., Dennis, B. R. “Double Coronal Hard and Soft X-ray Source Observed by *RHESSI*: Evidence for Magnetic Reconnection and Particle Acceleration in Solar Flares”, 2008, *ApJ*, 676, 704-716 49
3. **Liu, W.**, Liu, S., Jiang, Y. W., Petrosian, V. “*RHESSI* Observation of Chromospheric Evaporation”, 2006, *ApJ*, 649, 1124-1139 42
2. **Liu, W.**, Jiang, Y. W., Liu, S., Petrosian, V. “*RHESSI* Observations of a Simple Large X-Ray Flare on 2003 November 3”, 2004, *ApJ Letters*, 611, L53-L56 52
1. **Liu, W.**, Hu, Y. Q., Xia, L. D., Yang, Y. L. “Prominence Disturbance Caused by Magnetic Cancellation”, 2000, *Chinese Astronomy and Astrophysics*, 24, 365-373

Refereed Journals: Coauthored

20. Nitta, N. V., Schrijver, C. J., Title, A. M., **Liu, W.** “Large-scale Coronal Propagating Fronts in Solar Eruptions as Observed by the Atmospheric Imaging Assembly on Board the *Solar Dynamics Observatory* – an Ensemble Study”, 2013, *ApJ*, 776, 58, 13 pp.
19. Yang, L., Zhang, J., **Liu, W.**, Li, T., Shen, Y. “SDO/AIA and Hinode/EIS Observations of Interaction between an EUV Wave and Active Region Loops”, 2013, *ApJ*, 775, 39, 12 pp.
18. Liu, R., Liu, C., Xu, Y., **Liu, W.**, Kliem, B., Wang, H. “Observation of a Moreton Wave and Wave-Filament Interactions Associated with the Renowned X9 Flare on 1990 May 24”, 2013, *ApJ*, 773, 166, 13 pp.
17. Berger, T. E., **Liu, W.**, Low, B. C. “SDO/AIA Detection of Solar Prominence Formation within a Coronal Cavity”, 2012, *ApJ Letters*, 758, L37, 7 pp.
16. Low, B. C., **Liu, W.**, Berger, T., Casini, R. “The Hydromagnetic Interior of a Solar Quiescent Prominence. II. Magnetic Discontinuities and Cross-field Mass Transport”, 2012, *ApJ*, 757, 21, 15 pp.
15. Low, B. C., Berger, T., Casini, R., **Liu, W.** “The Hydromagnetic Interior of a Solar Quiescent Prominence. I. Coupling between Force-balance and Steady Energy-transport”, 2012, *ApJ*, 755, 34, 17 pp.
14. Schrijver, C. J., Brown, J. C., Battams, K., Saint-Hilaire, P., **Liu, W.**, Hudson, H., Pesnell, W. D. “Destruction of Sun-Grazing Comet C/2011 N3 (*SOHO*) Within the Low Solar Corona”, 2012, *Science*, 335, 324-328
13. Li, T., Zhang, J., Yang, S., **Liu, W.** “SDO/AIA Observations of Secondary Waves Generated by Interaction of the 2011 June 7 Global EUV Wave with Solar Coronal Structures”, 2012/02, *ApJ*, 746, 13, 9 pp.
12. Li, T., Zhang, J., Yang, S., **Liu, W.** “Kinematics and Amplitude Evolution of Global Coronal Extreme Ultraviolet Waves”, 2012, *Research in Astronomy and Astrophysics*, 12, 104-114
11. Ofman, L., **Liu, W.**, Title, A., Aschwanden, M. “Modeling Super-fast Magnetosonic Waves Observed by SDO in Active Region Funnels”, 2011, *ApJ Letters*, 740, L33, 6 pp.
10. Holman, G. D., Aschwanden, M. J., Aurass, H., Battaglia, M., Grigis, P. C., Kontar, E. P., **Liu, W.** Saint-Hilaire, P., Zharkova, V. V. “Implications of X-ray Observations for Electron Acceleration and Propagation in Solar Flares”, 2011, *Space Sci. Rev.*, 159, 107-166
9. Fletcher, L., Dennis, B. R., Hudson, H. S., Krucker, S., Phillips, K., Veronig, A., Battaglia, M., Bone, L., Caspi, A., Chen, Q., Gallagher, P., Grigis, P. T., Ji, H., **Liu, W.**, Milligan, R. O., Temmer, M. “An Observational Overview of Solar Flares”, 2011, *Space Sci. Rev.*, 159, 19-106
8. Nitta, N. V., Freeland, S. L., **Liu, W.** “An Alternative View of the Masuda Flare”, 2010, *ApJ Letters*, 725, L28-L33
7. Jiang, Y. W., Liu, S., **Liu, W.**, Petrosian, V. “Evolution of the Loop-top Source of Solar Flares: Heating and Cooling Processes”, 2006, *ApJ*, 638, 1140-1153
6. Boberg, F., Lundstedt, H., Hoeksema, J. T., Scherrer, P. H., **Liu, W.** “Solar Mean Magnetic Field Variability: a Wavelet Approach to Wilcox Solar Observatory and *SOHO*/Michelson Doppler Imager Observations”, 2002, *JGR*, 107(A10), 1318-1324
5. Zhao, X. P., Plunkett, S. M., **Liu, W.** “Determination of Geometrical and Kinematical Properties of Halo Coronal Mass Ejection Using the Cone Model”, 2002, *JGR*, 107(A8), 1223-1231
4. Hu, Y. Q., Jiang, Y. W., **Liu, W.** “Coronal Magnetic Flux Rope Equilibria and Magnetic Helicity”, 2001, *Chinese Journal of Astronomy & Astrophysics*, 1, 77-84
3. Hu, Y. Q., **Liu, W.** “A 2.5-dimensional Ideal Magnetohydrodynamic Model for Coronal Magnetic Flux Ropes”, 2000, *ApJ*, 540, 1119-1125
2. Yang, Y. L., Liu, S. L., Hu, Y. Q., **Liu, W.** “Numerical Study of Propagation Properties of Interplanetary Shocks”, 2000, *Chinese Journal of Geophysics*, 43 (4), 435-442
1. Chen, Y., Li, Z.Y., **Liu, W.**, Shi, Z. D. “Solitary Kinetic Alfvén Waves in The Inertial Limit Region”, 2000, *Physics of Plasmas*, 7, 371-374

Conference Proceedings

3. **Liu, W.**, Berger, T. E., Low, B. C. “Coronal Condensation in Funnel Prominences as Return Flows of the Chromosphere-Corona Mass Cycle”, 2013, IAU Symposium, *Nature of Prominences and Their Role in Space Weather*, Eds. B. Schmieder, J.-M. Malherbe, & S.-T. Wu, submitted
2. **Liu, W.**, Zhao, X. P., Wu, S. T., Scherrer, P. H. “Effects of Magnetic Topology on CME Kinematic Properties”, 2003, in *ESA SP Series 535, the International Solar Cycle Studies (ISCS) Symposium: Solar Variability as an Input to the Earth's Environment*, Ed. A. Wilson (Noordwijk: ESA Publications Division), 459-464
1. **Liu, W.**, Plunkett, S. P. Zhao, X. P. “A Cone Model for Coronal Mass Ejections”, 2002, in *COSPAR Colloquia Series 14, Solar-Terrestrial Magnetic Activity and Space Environment*, Eds. H. Wang & R. Xu (Boston: Pergamon), 267-269

Other Publications (book, dissertation, online)

3. **Liu, W.** “Solar Flares as Natural Particle Accelerators: A High-energy View from X-ray Observations and Theoretical Models” – a *monograph* (revised PhD Thesis) published by *Verlag Dr. Müller* (Saarbrücken, Germany), 2008, ISBN: 978-3-8364-7432-0, 252 pp. ([ADS](#), [PDF](#), [Barnes & Noble](#), [Amazon](#))
2. **Liu, W.** Petrosian, V. “Double Coronal Hard X-ray Source”, *RHESSI Science Nuggets, No. 61*, 10/2007
1. **Liu, W.** “Characteristics of Solar Flare Hard X-ray Emissions: Observations and Models”, Dec. 2006, PhD Thesis, Stanford University (228 pp., [PDF](#)); published by *Proquest Dissertations And Theses 2007*, Section 0212, Part 0373, AAT 3242584

Presentations

Invited Seminars

5. “The Dynamic Solar Corona in the Big Data Era”, Department of Physics, New Jersey Institute of Technology, Newark, NJ, 01/2013
4. “The Dynamic Solar Corona Seen by *SDO/AIA* at High Spatio-temporal Resolution”, Department of Physics and Astronomy, Rice University, Houston, TX, 11/2011
3. “Combined Particle-Hydrodynamic Simulations of Solar Flares and *Hinode* Observations of a Chromospheric Jet Resulting from Flux Emergence”, High Altitude Observatory, Boulder, CO, 03/2010
2. “High Energy Aspects of Solar Flares: *RHESSI* X-ray Observations and Combined Particle & Hydrodynamic Simulations”, Lockheed Martin Solar and Astrophysics Lab, Palo Alto, CA, 11/2008
1. “Investigation of Solar Flares with *RHESSI* X-ray Observations and Combined Particle-Hydrodynamic Simulations”, Solar Terrestrial Relationships Branch, Naval Research Lab, Washington, DC, 11/2007

Selected Conference Talks

17. “Probing the Dynamic Corona With the Advanced Technology Solar Telescope (ATST)”, ATST Coronal Science Workshop, Boulder, CO, 11/2013
16. “Recent Advances in Observations of Coronal EUV Waves: *SDO/AIA* Highlights” (*Invited Review*), LWS/*SDO* Workshop, Cambridge, MD, 03/2013
15. “Particle Acceleration and Plasma Heating in Bi-directional Reconnection Outflows Revealed by *SDO/AIA* and *RHESSI* Observations”, Solar in Sonoma Workshop: Tracing the Connections in Solar Eruptive Events, Petaluma, CA, 11/2012
14. “*SDO/AIA* Detection of Quasi-periodic Wave Trains Within Global EUV (‘EIT’) Waves and Their Coronal Seismology Implications”, American Astronomical Society (AAS) Meeting 220, Anchorage, AK, 06/2012 (Abstract 515.01)

13. “*SDO/AIA* Observations of Coronal EUV Waves and Their Seismological Implications” (*Invited Review*), Workshop on Coronal Magnetism, Boulder, CO, 05/2012
12. “Sun-grazing Comets (C/2011 N3 and Lovejoy) Seen by *SDO/AIA* and Their MHD Implications”, Comet Lovejoy Workshop, Boulder, CO, 03/2012
11. “*SDO/AIA* Observations of Sustained Coronal Condensation and Mass Drainage in Prominences as Return Flows of the Chromosphere-Corona Mass Cycle”, *SDO-4/IRIS/Hinode* Workshop, Monterey, CA, 03/2012
10. “*SDO/AIA* Observations of a Global EUV Disturbance Traveling into a Coronal Cavity and Its Subsequent Oscillations: New Evidence of Fast Mode MHD Waves”, AAS/Solar Physics Division (SPD) Meeting 42, Las Cruces, NM, 06/2011 (Abstract 9.06)
9. (1) “Direct Imaging by *SDO/AIA* of Quasi-periodic Propagating Fast Mode Magnetosonic Waves of ~2000 km/s in the Solar Corona”, (2) “*SDO/AIA* Observations of Coronal Condensation Leading to Prominence Formation”, LWS/*SDO* Workshop, Squaw Valley, CA, 05/2011
8. “First *SDO/AIA* Observations of Global Coronal EUV Waves: Multiple Components and Ripples”, American Geophysical Union (AGU) Fall Meeting, San Francisco, 12/2010 (Abstract SH13A-07)
7. “Direct Imaging of an Emerging Flux Rope and a Resulting Chromospheric Jet Observed by *Hinode*”, AAS Meeting 216, Miami, FL, 05/2010, (Abstract 403.07)
6. “Combined Fokker-Planck Modeling of Particle Acceleration/Transport and Hydrodynamic Simulation of Atmospheric Response in Solar Flares”, AGU Fall Meeting, San Francisco, 12/2009 (Abstract SH21C-04)
5. “Testing the Neupert Effect with Combined Fokker-Planck and Hydrodynamic Simulations”, 37th COSPAR Scientific Assembly, Montreal, Canada, 07/2008 (Abstract E22-0033-08)
4. “Characteristics of Solar Flare Hard X-ray Emissions: Observations and Models”, AAS Meeting 210, Honolulu, HI, 05/2007 (Abstract 068.01D)
3. “X-ray Emission from Flaring Loops: Comparison Between *RHESSI* Observations and Hydrodynamic Simulations”, AAS/SPD Meeting 37, Durham, NH, 06/2006 (Abstract 27.05)
2. “Impulsive Phase Hard X-Ray Source Motions Observed by *RHESSI*”, AGU Spring Meeting, New Orleans, LA, 05/2005 (Abstract SP41C-06)
1. “Source Motions and Foot-point Asymmetries in the 2003 October-November X-class Flares Observed by *RHESSI*”, AAS Meeting 204, Denver, CO, 05/2004 (Abstract 47.14)

Honors and Awards

Marquis Who's Who in America, 2012, 2013

NASA Postdoctoral Program (NPP) Fellowship, previously known as the National Research Council (NRC) Postdoctoral Fellowship, 2007 – 2009

Studentship Award by the American Astronomical Society (AAS) Solar Physics Division (SPD), 2003

Meritorious Award in the US Mathematical Contest in Modeling (MCM), 1997

First-class Award in the MCM, Chinese Society for Industrial and Applied Mathematics, 1995 & 1996

Professional Affiliations

Sigma Xi, the Scientific Research Society

2008 – 2012

American Astronomical Society (AAS) / Solar Physics Division (SPD)

2002 – present

American Geophysical Union (AGU)

2001 – present

Community Service

<i>Team Member</i> , Comet ISON (C/2012 S1) Observing Campaign using the Dunn Solar Telescope of the National Solar Observatory (PI: Diane Wooden)	11/2013
<i>LOC Member</i> , “Solar in Sonoma: Tracing the Connections in Solar Eruptive Events”, California Wine Country Conference Series No. 3, Petaluma, CA	11/2012
<i>Initiated and coauthored</i> “Magnetic Flux Ropes from the Sun to the Heliosphere”, a community-input proposal topic selected as one of the <i>2013 Living With a Star Targeted Research & Technology Focus Topics</i> (Lead author: Thomas Berger)	07/2012
<i>Seminar Organizer</i> , Lockheed Martin Solar and Astrophysics Laboratory	01/2010 – 02/2011
<i>Reviewer for Astrophysical Journal (Letters), Solar Physics, Astronomy & Astrophysics, and NASA proposals</i>	2008 – present
<i>Judge</i> for Outstanding Student Paper Awards at American Geophysical Union meetings	2007, 2013

Technical and Computing Skills

Analysis and interpretation of large volume, multi-wavelength (EUV, soft and hard X-rays, white light, magnetic field) data sets from space- and ground-based solar observatories: *SDO/AIA*, *Hinode/SOT*, *RHESSI*, *SOHO/MDI*, *LASCO*, *EIT*, *TRACE*, and Wilcox Solar Observatory (WSO)

Numerical modeling of plasma: (1) kinetic approach: Fokker-Planck calculation of particle acceleration and transport (2) fluid approach: Magnetohydrodynamics (MHD) and Hydrodynamics (HD) simulations

Fourier/Wavelet analysis of time series data

Languages: IDL, Fortran, C/C++, Unix shell script, HTML

Software Packages: Solar SoftWare (SSW), Numerical Recipes, Latex, Microsoft Office

Platforms: Unix/Linux, Macintosh, Windows