

Sushant S. Mahajan

EDUCATION

Ph.D. in Astronomy, Georgia State University, USA 2019
Thesis: *Observational Constraints on the Solar Dynamo and the Hunt for Precursors to Solar Flares*
Advisor: Prof. Petrus C. Martens

Master of Science, Physics, Georgia State University, USA 2014 – 2017

Master of Technology, Engineering Physics 2014
Indian Institute of Technology (Banaras Hindu University), Varanasi, India
Thesis: *The Effect Of Torsional Oscillations On The Solar Cycle*
Advisors: Dr. Dibyendu Nandi & Prof. B.N. Dwivedi

PROFESSIONAL HISTORY

Solar Physics Postdoctoral Fellow, Institute for Astronomy, University of Hawaii, USA 2019 – present

Visiting Research Assistant, Catholic University of America, Washington D.C., USA 2018 – 2019

Graduate Teaching Assistant for freshman level labs of Physics & Astronomy courses Georgia State University, USA 2014 – 2018

Summer Research Fellow, 2016
NASA Advanced Supercomputing Division, Ames Research Center, USA

Summer Research Fellow, Center of Excellence in Space Sciences, India 2013 – 2014

Solar Physics REU (Research Experience for Undergraduates), 2012
Montana State University, USA

Summer Research Intern, 2011
Indian Institute of Science Education and Research (IISER), Kolkata, India

COMPUTATIONAL SKILLS

- High proficiency: FORTRAN, MATLAB, Python, bash
- Intermediate proficiency: IDL, Julia, C++, HTML
- Parallel processing and optimization in Fortran, C++ and MATLAB using OpenMP & MPI
- GPU computing in MATLAB, CUDA C++
- Visualization : MATLAB, Python, ParaView
- Statistics and Machine Learning toolbox: MATLAB

TEACHING EXPERIENCE

Teaching labs of the freshman level Astronomy and Physics courses 2014 – Present
Georgia State University, USA

Substitute lecturer for undergraduate level Electromagnetism course PHYS 2212K 2 lectures

AWARDS & HONORS

<i>Best Young Presenter Award</i> for my talk on “Torsional oscillations: a tool to map magnetic field amplification inside the Sun” at IAU Symposium 340 in Jaipur, India	2018
My article titled “Measuring Meridional Flow and Differential Rotation of the Sun from Magnetograms” appeared in <i>Highlight on Young Scientists</i> section of VarSITI newsletter #15	2017
<i>Best Young Scientist Poster</i> award for my poster on “Using Torsional Oscillations to forecast solar activity” at IAU Symposium 335 in University of Exeter, UK	2017
<i>Honorary mention</i> in the Best Student Poster contest at the Solar Physics Division (SPD/AAS) meeting in 2016 in Boulder, Colorado, USA	2016
<i>Second Century Initiative (2CI) Fellowship</i> , Georgia State University	2014 – 2018
<i>Graduate Aptitude Test in Engineering (GATE) 2014 Fellowship</i> for my Master’s thesis from Department of Science & Technology, Govt. of India	2013 – 2014
<i>Best Idea Award</i> for simulation project on “Preventing asteroid impact with Earth” at Technex, the annual technical festival of Indian Institute of Technology (Banaras Hindu University)	2011
<i>Silver Star award</i> for being one of the best all-rounders of the S.B.O.A. Public School, Aurangabad, India	2007

ORAL PRESENTATIONS

“Inflows Around Active Regions Explain Solar Cycle Scale Variations in Photospheric Meridional Flow During Cycle 24” at the SPD-AAS meeting(online)	2021
“Explaining Empirical Relationships Found in Sunspot Number and Area Time Series with a Simplified Dynamo Model” at AGU meeting(online)	2020
“Observational Constraints on the Solar Dynamo” at the SPD-AAS meeting in St. Louis, Missouri, USA	2019
“Spying on the heart of the solar dynamo” in the Heliophysics Seminar at NASA Goddard Space Flight Center, Greenbelt, Maryland, USA	2018
“Spying on the heart of the solar dynamo” at the 14 th quadrennial SCOSTEP meeting in Toronto, Canada	2018
“Torsional Oscillations: a tool to map magnetic field amplification inside the Sun” at IAU Symposium 340 in Jaipur, India	2018
“Addressing systematic errors in correlation tracking on solar magnetograms” at 48th Solar Physics Division meeting in Portland, Oregon, USA	2017
“Can torsional oscillations indicate the location of solar magnetic field production?” at IAU Symposium 328 in Maresias, Brazil	2016
“Surface Flux Transport Simulations” at the International Symposium for Solar Terrestrial Physics, Pune, India	2012

POSTER PRESENTATIONS

“The solar dynamo as an interplay of rotational shear and magnetic field” at SHINE meeting in Cocoa Beach, Florida	2018
“Measurements of Meridional Flow and Differential Rotation on the Sun’s surface from 1995-2017” at IAU Symposium 340 in Jaipur, India	2018
“Using Torsional Oscillations to Forecast Solar Activity” at IAU Symposium 335 in University of Exeter, UK	2017
“The Effect Of Torsional Oscillations On The Solar Cycle: Waldmeier Effect As An Outcome” at AAS Solar Physics Division meeting at Boulder, Colorado, USA	2016
“Big Data Problems In Solar Physics” at NSF sponsored Data Science Workshop 2015 in Seattle, Washington, USA	2015
“The effect of anti-Hale regions on surface flux transport on the Sun” at Flux Emergence Workshop 2015 in Boulder, Colorado, USA	2015

SUMMER/WINTER SCHOOLS ATTENDED

NASA Heliophysics Summer School in Boulder, Colorado, USA	2015
Center for Interplanetary Space Weather Modelling (CISM) Summer School in Boulder, Colorado, USA	2015
8 th Winter Workshop & School on Astroparticle Physics, 2013 Center for Astroparticle Physics and Space Science, Bose Institute, Darjeeling, India	2013

PUBLIC OUTREACH

Judge at “Maui County Regional Science and Engineering Fair”, Hawaii, USA	2020 – present
“Introduction to Solar Physics” lecturer at HI star, the outreach program at Institute for Astronomy, University of Hawaii, USA	2020 – present
Volunteer at Hard Labor Creek Observatory, Rutlege, Georgia, USA Set up telescopes and supervised observations on open house nights	2015 – 2018
Volunteer at Urban Life Observatory, Georgia State University, USA Set up telescopes and supervised observations on campus on open house nights	2014 – 2018
Presented a seminar “Know Thy Sun” at Charlie Elliott wildlife center’s Astronomy club in Georgia, USA	2018
Telescope controller for “Stars over Yellowstone Night” at Yellowstone National Park, USA	2012

PUBLICATIONS*

- Improved Measurements of the Sun's Meridional Flow and Torsional Oscillation from Correlation tracking on MDI & HMI magnetograms* ApJ, accepted 2021
Sushant S. Mahajan, David H. Hathaway, Andrés Muñoz-Jaramillo, Petrus C. Martens
- How to Train Your Flare Prediction Model: Revisiting Robust Sampling of Rare Events* ApJS, 2021
Azim Ahmadzadeh, Berkay Aydin, Manolis K. Georgoulis, Dustin J. Kempton, Sushant S. Mahajan, and Rafal A. Angryk
- Multivariate Time Series Dataset for Space Weather Data Analytics* Nature Scientific Data, 2020
Rafal A. Angryk, Petrus C. Martens, Berkay Aydin, Dustin Kempton, Sushant S. Mahajan, Sunitha Basodi, Azim Ahmadzadeh, Xumin Cai, Soukaina Filali Boubrahimi, Shah Muhammad Hamdi, Michael A. Schuh & Manolis K. Georgoulis
- Challenges with extreme class-imbalance and temporal coherence: A study on solar flare data* IEEE, 2019
Azim Ahmadzadeh, Maxwell Hostetter, Berkay Aydin, Manolis K Georgoulis, Dustin J Kempton, Sushant S Mahajan, Rafal Angryk
- Rare-Event Time Series Prediction: A Case Study of Solar Flare Forecasting* IEEE, 2019
Azim Ahmadzadeh, Berkay Aydin, Dustin J Kempton, Maxwell Hostetter, Rafal A Angryk, Manolis K Georgoulis, Sushant S Mahajan
- Hemispheric Preference and cyclic variation of Filament chirality from 2000 to 2016* ApJ, 2018
Soumitra Hazra, Sushant S. Mahajan, William Keith Douglas Jr. & Petrus C. Martens
- Filling the Gaps in Solar Big Data: Interpolation of Solar Filament Event Instances* 2016
S. Filali Boubrahimi, B. Aydin, D. Kempton, Sushant S. Mahajan, R. Angryk
Proceedings of the 6th International Conference on Big Data and Cloud Computing
- Complex Classical Mechanics of a QES (Quasi Exactly Solvable) Potential* 2014
Bhabani P. Mandal, Sushant S. Mahajan
Communications in Theoretical Physics

*updated status and links to all publications available at www.solarmagnetism.org/publications.html