Sushant S. Mahajan

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EDUCATION

Ph.D. Candidate in Astronomy, 2017 – Present
Georgia State University, USA
Advisor: Prof. Petrus C. Martens

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

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: Prof. B.N. Dwivedi & Dr. Dibyendu Nandi

PROFESSIONAL HISTORY

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

Graduate Teaching Assistant, 2014 – Present
Georgia State University, USA
Currently teaching freshman level lab sections of Astronomy and Physics courses

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

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

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

PUBLICATIONS

Hemispheric Preference and cyclic variation of Filament chirality from 2000 to 2016 submitted
Soumitra Hazra, Sushant S. Mahajan, William Keith Douglas Jr. & Petrus C. Martens

The Impact Of Torsional Oscillations On The Solar Cycle: Waldmeier Effect As An Outcome submitted
Sushant S. Mahajan, Dibyendu Nandy, H.M. Antia, B.N. Dwivedi

Complex Classical Mechanics of a QES Potential 2014
Bhabani P. Mandal, Sushant S. Mahajan

ORAL PRESENTATIONS

"Torsional Oscillations: a tool to map magnetic field amplification inside the Sun" 2018
at IAU Symposium 340 in Jaipur, India

"Using Torsional Oscillations to Forecast Solar Activity" 2017
at IAU Symposium 335 in University of Exeter, UK

"Addressing systematic errors in correlation tracking on solar magnetograms" 2017
at 48th Solar Physics Division meeting in Portland, Oregon, USA

"Can Torsional Oscillations Indicate The Location Of Solar Magnetic Field Production?" 2016
at IAU Symposium 328 in Maresias, Brazil

"Surface Flux Transport Simulations" at the International Symposium for Solar Terrestrial 2012
Physics 2012, Pune, India

POSTER PRESENTATIONS

"Measurements of Meridional Flow and Differential Rotation on the Sun's surface from 1995-2017" 2018
at IAU Symposium 340 in Jaipur, India

"The Effect Of Torsional Oscillations On The Solar Cycle: Waldmeier Effect As An Outcome" 2016
at AAS Solar Physics Division meeting at Boulder, Colorado, USA

"Big Data Problems In Solar Physics" 2015
at NSF sponsored Data Science Workshop 2015 in Seattle, Washington, USA

"The Effect Of Anti-Hale Regions On Surface Flux Transport On The Sun" 2015
at Flux Emergence Workshop 2015 in Boulder, Colorado, USA

AWARDS & HONORS

Best Young Presenter Award for my talk on "Torsional oscillations: a tool to map magnetic field amplification inside the Sun" at IAU Symposium 340 in Jaipur, India 2018

Best Young Scientist Poster award for my poster on "Using Torsional Oscillations to forecast solar activity"
at IAU Symposium 335 in University of Exeter, UK 2017

Honorary mention in the Best Student Poster contest at the 2016
Solar Physics Division (SPD/AAS) meeting in 2016 in Boulder, Colorado, USA

Second Century Initiative (2CI) Fellowship, Georgia State University 2014 – Present

Graduate Aptitude Test in Engineering (GATE) 2014 Fellowship for my 2013 – 2014

Master's thesis project

Best Idea Award for simulation project on "Preventing asteroid impact with Earth" at Technex 2011, the annual technical festival of Indian Institute of Technology (Banaras Hindu University) 2011

Silver Star award for being one of the best all-rounders of the S.B.O.A. Public School, Aurangabad, India 2007

RESEARCH EXPERIENCE

Comparison of automatic and manual determination of the Chirality of Solar Filaments 2015–Present
Georgia State University, USA
Advisor: Prof. Petrus C. Martens, Dr. Soumitra Hazra

- Calibration of the accuracy of the AAFDCC code developed by Dr. Bernasconi for automatic detection of filament chirality with manual observations

Signatures of Magnetic field production in the Solar Convection Zone 2014–Present
Center of Excellence in Space Sciences, India
Advisor: Dr. Dibyendu Nandi

- Modelled the effects of magnetic field generation on plasma flows inside the Solar convection zone.
- Looked for the signatures of these effects in rotation inversions of helioseismic data from Global Oscillations Network Group (GONG).

Masters thesis: The Effect Of Torsional Oscillations On The Solar Cycle 2014
Indian Institute of Technology (Banaras Hindu University), Varanasi, India &
Center of Excellence in Space Sciences, India
Advisors: Prof. B.N. Dwivedi & Dr. Dibyendu Nandi

- Plugged in the helioseismic data for torsional oscillations from GONG into a flux transport dynamo model for the Sun to see its effect on the solar cycle.
- Found that the Waldmeier effect observed in solar cycles can be explained by the inclusion of torsional oscillations.

Development of a Surface Flux Transport Code 2011 – 2013
Indian Institute for Science Education and Research, Kolkata, India
Advisor: Dr. Dibyendu Nandi

- Developed a Surface Flux Transport code for simulating the evolution of radial magnetic field on stellar surfaces.
- Developed an algorithm for importing RGO sunspot data and HMI/MDI magnetogram data into the Surface Flux Transport code.
- Enhanced the performance of the code by configuring it to run parallely on multiple processors.

Stability analysis of time delay dynamo equations 2012
Montana State University, Bozeman, USA
Advisors: Prof. Petrus C. Martens

- Conducted a bifurcation analysis of time delay dynamo equations to look for ways for a dynamo system to survive after phases like the Maunder minimum.

SKILLS

Operating systems : Linux, OS X, Microsoft Windows 98, XP, 7, 8 and 10

Computer languages :

- High proficiency: Fortran, C/C++, MATLAB, bash
- Basic proficiency: SunPy, IDL, Mathematica, HTML
- Experience with parallel processing in Fortran using OpenMP, MPI
- Software packages : MS Office, LaTeX

Languages :

- Fluent: English, Hindi, Marathi
- Basic: Sanskrit, Japanese

MEMBERSHIPS

American Astronomical Society 2014 – Present

American Astronomical Society, Solar Physics Division 2014 – Present

WORKSHOPS ATTENDED

Center for Interplanetary Space Weather Modelling (CISM) Summer School 2015 2015
Boulder, Colorado, USA

NSF sponsored Data Science Workshop, 2015 2015
University of Washington, Seattle, USA

NASA LWS Workshop on Solar Dynamo Frontiers: Helioseismology,
3D Modeling and Data Assimilation 2015
High Altitude Observatory, Boulder, CO, USA

Flux Emergence Workshop, 2015 2015
High Altitude Observatory, Boulder, CO, USA

8^{th} Winter Workshop & School on Astroparticle Physics, 2013 2013
Center for Astroparticle Physics and Space Science, Bose Institute, Darjeeling, India

PUBLIC OUTREACH

Volunteer at Hard Labor Creek Observatory 2015 – Present
Setting up telescopes and supervising observations at open houses.

Volunteer at Urban Life Observatory 2014 – Present
Setting up telescopes and supervising observations on campus at Georgia State University's Astronomy open houses.

Volunteer for star parties at Yellowstone National Park, USA 2012