Sushant S. Mahajan

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SUMMARY

Research scientist and computational physicist building data-driven systems for solar physics, scientific inference, time-series analysis, and scientific AI systems.

EXPERIENCE

Research Scientist, W. W. Hansen Experimental Physics Laboratory, Stanford University 2024–present

- Responsible for developing an agentic AI-powered JSOC Data Commons server for public query and visualization of SDO data.
- Lead research on solar dynamics and large-scale flows from HMI/SDO observations.
- Responsible for producing new electric and velocity field-based metadata parameters from SDO/HMI data.

Postdoctoral Fellow, W. W. Hansen Experimental Physics Laboratory, Stanford University 2022–2024

- Published first-author work on differential rotation, torsional oscillation, and meridional flow.
- Helped deliver the Stanford Solar Observatories Group data-sharing effort recognized in 2026.
- Collaborated across research, software, and data management teams on mission-facing analysis.

Solar Physics Postdoctoral Fellow, Institute for Astronomy, University of Hawai'i 2019–2022

- Built analysis pipelines for active-region inflows, solar-cycle trends, and helioseismic flow inference.
- Contributed to forecasting-oriented work on rare events and solar flare data.

SELECTED IMPACT

- NASA Silver Group Achievement Award for JSOC flood recovery efforts 2025
- Stanford University Libraries Data Sharing Prize, Stanford Solar Observatories Group 2026
- Editor's Choice, *Solar Physics*, for *The Sun's Large-Scale Flows I* 2024
- Prepared and published the SWAN-SF benchmark dataset used in solar-flare AI work 2020
- Presentation awards: Best Young Presenter Award (IAU Symposium 340), Best Young Scientist Poster Award (IAU Symposium 335), Honorary Mention (SPD meeting) 2018–2016

SELECTED TALKS & MEDIA

"Unveiling the Sun: Exploring the Wonders of Solar Astrophysics," KIPAC public lecture and "The Influence of Active Regions on Plasma Flows Inside the Sun," UCAR/HAO colloquium 2023

"Unveiling the Solar Poles: Addressing Projection Artifacts and Revealing Circumpolar Features in HMI Magnetograms," AAS/SPD 246, Anchorage, AK 2025

KRON4, NBC Bay Area, ABC7 Bay Area, and *San Francisco Chronicle* coverage of the 2024 Northern Lights 2024

SELECTED PUBLICATIONS

Mahajan, S. S., Upton, L. A., Antia, H. M., Basu, S., DeRosa, M. L., Hess Webber, S. A., et al.
The Sun's Large-Scale Flows I: Measurements of Differential Rotation & Torsional Oscillation. Solar Physics 299, 38 2024

Mahajan, S. S., Sun, X., and Zhao, J.
Removal of Active Region Inflows Reveals a Weak Solar Cycle Scale Trend in the Near-Surface Meridional Flow. Astrophysical Journal 950, 63 2023

Dash, S., DeRosa, M. L., Dikpati, M., Sun, X., **Mahajan, S. S.**, Liu, Y., and Hoeksema, J. T.
Ensemble Kalman Filter Data Assimilation into the Surface Flux Transport Model to Infer Surface Flows. Astrophysical Journal 2024

SKILLS

Python, MATLAB, Fortran, bash, OpenMP, MPI, C++, CUDA, scientific computing, time-series analysis, machine learning workflows, data analysis, visualization, and technical writing.

EDUCATION

Ph.D. in Astronomy, Georgia State University 2019
M.S. in Physics, Georgia State University 2017
M.Tech. in Engineering Physics, IIT (BHU) 2014