BIBHUTI KUMAR JHA

Post Doctoral Researcher
ARIES, Nainital

CONTACT

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https://bibhuraushan.github.io

RESEARCH SKILLS

• Image Processing

Image restoration, feature identification, feature tracking and other processing in the historical and modern space based solar images.

• Numerical Techniques

Roots finding, differentiation, integration, solution of multidimensional linear equations, solution of differential equations, etc. Familiar with 2D kinematic dynamo code **SURYA** developed by Prof. Arnab Rai Choudhuri and co.

• Data Statistics

Descriptive and Inferential statistics (Frequentist and Bayesian Inferences), etc.

• Machine Learning

Linear Regression, classification (K-means clustering), Feature identification based on ML & AI (beginner)

AREA OF RESEARCH

My primary area of research is Solar Astrophysics. I work on century-long archived data obtained at the different ground and space-based observatories to understand the long-term variation in the Sun. I work on the development of automatic algorithms using various image processing and mathematical techniques to extract solar magnetic features from digital images. Then, I study and analyse the physical parameters extracted from these features to understand the physics underneath. In addition, I am also interested in the Solar Dynamo theory to understand the magnetic cycle of the Sun. Moreover, I am also willing to expand my understanding of the various exciting phenomena happening in the solar atmosphere.

RESEARCH EXPERIENCE

- **Post Doctoral Researcher (PDR)** Aryabhatta Research Institute of Observational Sciences (ARIES), Nainital; **(Feb 2022 on-wards)**
- **Research Fellow** Indian Institute of Astrophysics (IIA), Bangalore & Aryabhatta Research Institute of Observational Sciences (ARIES), Nainital; **(Jan 2017 – Jan 2022)**

EDUCATION

- **Ph.D. (Solar Astrophysics):** Indian Institute of Astrophysics (IIA), Bangalore (Registered with Pondicherry University, Puducherry); **(2017–2022)**

  Thesis Title: Long–term study of the Sun and its implications to solar dynamo models
  Thesis Supervisor: Prof. Dipankar Banerjee

  (Thesis Submitted on 3rd February, 2022 to Pondicherry University, India)
- **M.Sc. (Physics):** Department of Physics & Astrophysics , University of Delhi, New Delhi, India; **(2014–2016)**
- **B.Sc. (Physics):** Dyal Singh College, University of Delhi, New Delhi, India; **(2011–2014)**

PUBLICATIONS

- **A theoretical model of the near-surface shear layer of the Sun**
  Bibhuti Kumar Jha & Arnab Rai Choudhuri; *MNRAS (2021) 506:2 (2189)*
- **Measurements of Solar Differential Rotation Using the Century Long Kodaikanal Sunspot Data**
  Bibhuti Kumar Jha, Aditya Priyadarshi, Sudip Mandal, Subhamoy Chatterjee & Dipankar Banerjee; *Sol Phys (2021) 296: 25*
- **Magnetic field dependence of bipolar magnetic region tilts on the Sun: Indication of tilt quenching**
  Bibhuti Kumar Jha, Bidya Binay Karak, Sudip Mandal, Dipankar Banerjee; *APjL (2020) 889:L19*

COMPUTER SKILLS

C, C++	9+ yrs
IDL, Python	5+ yrs
R, Rust, Julia	2+ yrs
Mathematica, Fortran	1+ yrs
LaTex, Html/CSS	5+ yrs
Adobe Photoshop	8+ yrs
Adobe Lightroom	3+ yrs
InkScape	2+ yrs

PROFILES

- NASA ADS
- Google Scholar
- ArXive
- ORCID
- ResearchGate

- **Delving into the Historical Ca II K Archive from the Kodaikanal Observatory: the Potential of the Most Recent Digitised Series**
  Theodosios Chatzistergos, Ilaria Ermolli, Sami K. Solanki, Natalie A. Krivova, Dipankar Banerjee, Bibhuti K. Jha, Subhamoy Chatterjee; *Sol Phys (2019) 294: 145*
- **Study of Sunspot Penumbra to Umbra Area Ratio Using Kodaikanal White-light Digitised Data**
  Bibhuti Kumar Jha, Sudip Mandal, & Dipankar Banerjee, *Sol Phys (2019) 294: 72*
- **Long-term variation of sunspot penumbra to umbra ratio: A study using Kodaikanal white-light digitized data**
  Bibhuti Kumar Jha, Sudip Mandal, & Dipankar Banerjee 2018, *Proceedings of the International Astronomical,Union, 13, 185–186*

CONFERENCES AND MEETINGS

- Presented a talk titled **Update on Ca-K data from Kodaikanal Solar Observatory**, Workshop on "Long-term study of the solar activity" in the 40th Astronomical Society of India Meeting, 25-29 March, 2022
- Presented a poster titled **A Theoretical Model of the Near-Surface Shear Layer of the Sun**, The 40th Astronomical Society of India Meeting, 25-29 March, 2022
- Presented a talk titled **A Theoretical Model of the Near-Surface Shear Layer of the Sun**, The 15th Quadrennial Solar-Terrestrial Physics (STP-15) symposium, 21-25 February, 2022, **Online**
- Presented a e-poster titled **A Theoretical Model of the Near-Surface Shear Layer of the Sun**, The 16th European Solar Physics Meetings (ESPM-16), 6-10 September, 2021, **Online**
- Presented a talk titled **Signature of quenching from observation of tilted bipolar magnetic regions on the Sun**, IIA-50 Conference - Advances in Observations and Modelling of Solar Magnetism and Variability, 1-4 March, 2021, IIA, Bangalore, India
- Presented a talk titled **Magnetic field dependence of bipolar magnetic region tilts on the Sun: Evidence of tilt quenching**, Astronomical Society of India Meeting 2020, 13-17 February, 2020, IISER Tirupati, India
- Presented a poster titled **Solar differential rotation as measured from century long Kodaikanal white light digitized data**, 5th Asia Pacific Solar Physics Meeting (APSPM), 3-7 February, IUCAA, Pune, India
- Presented a poster titled **Magnetic field dependency of bipolar magnetic region tilt angle: A study using MDI and HMI data sets**, IRIS-10, 4-8 November, 2019, Christ University Bangalore, India
- Presented a poster titled **Solar Differential Rotation in last century: A study from Kodaikanal white light digitised data**, Young Astronomers Meet, 23-27 September, 2019, Kodaikanal Solar Observatory, IIA Kodaikanal, India
- Attended **Solar Physics Summer School at Raman Science Center**,10 - 16 June, 2019, Leh, India
- Presented an oral talk titled **An update on Kodaikanal Digital Archived Data** in a meeting entitled "Reconstructing Solar and Heliospheric Magnetic Field Evolution Over the Past Century", ISSI Team led by Alexei Pevtsov; 12 - 15 February, 2019
- Presented an oral talk titled **Magnetic field dependency of Bipolar magnetic region tilt angle: A study from SOHO/MDI data**, Young Astronomers Meet, 24-28 September, 2018, PRL, Ahmadabad, India
- Attended **Heliophysics Summer School**, 23 - 20 July, 2018 - Boulder, Colorado, USA

OTHER SKILLS

Photography

Apart from my research work photography is the area where I spend most of my time.

- Presented a poster titled **Long-term variation of sunspot penumbra to umbra ratio: A study using Kodaikanal white-light digitized data.**, IAUS-340, 19 - 24 February, 2018, Jaipur, India

VISITS

- Visiting Scholar at Indian Institute of Technology (IIT), Banaras Hindu University (BHU), Varanasi, India; December 2018
- Visiting Scholar at Max Planck Institute for Solar System Research, Göttingen, Germany; Feb - May, 2019

FELLOWSHIPS

- **CSIR NET-JRF 2017**

PARTIAL GUIDANCE

- **Tanushree Bhattacharya**; Currently a BS-MS student at Indian Association for the Cultivation of Science, Kolkata, India; **(NIUS Student)**
- **Aditya Priyadarshi**; Former BS-MS student at Indian Institute of Science Education and Research, Kolkata; **(Master Thesis)**
- **Anu Sridevi**; Currently a PhD student at Indian Institite of Technology (BHU), Varanasi, India)
- **Dibya Kirti Mishra**; Currently a PhD student at ARIES Nanital, India)

OTHER RESPONSIBILITIES

- Organised a workshop in 40th Astronomical Society of Indian annual meeting 2022 titled **"Long–term Study of Solar Activity."**
- Active role in the organisation of ARIES E-lecture series 2020.