

Swagat Ranjan Das

Curriculum Vitae

Department of Astronomy
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Research interest

My research interest are focused on study of Galactic massive star formation, HII regions, star clusters, IR dust bubbles, extended green objects (EGOs), massive young stellar objects (MYSOs), nature of ISM and complex molecules in the star forming regions. Also, I have interest in exploring the star-formation rate, efficiency, and nature of initial mass function (IMF) of Galactic massive star forming regions.

Educational Qualifications

- 2012 – 2018 Ph.D. in Astronomy & Astrophysics at Indian Institute of Space Science and Technology, (IIST), India.
Thesis title : Observational studies of Galactic star-forming regions.
Research supervisor: Dr. Anandmayee Tej
- 2006 – 2008 Masters in Science (MSc.) in Physics at Sambalpur University, Sambalpur, Odisha, India.
- 2003 – 2006 Bachelor in Science (BSc.) with Physics as major at Utkal University, Bhubneswar, Odisha, India

Present position

- June 2018 – Dec 2021 : Post-doctorate fellow at the Department of Physics of Indian Institute of Science Education and Research (IISER), Tirupati, India.
Mentor: Dr. Jessy Jose
- April 2022 – Till now : FONDECYT Post-doctorate fellow at the Department of Astronomy, University of Chile.
Mentor: Prof. Leonard Bronfman

Technical skills

- **Programming Languages:** Proficient in Python and also has basic ability with IDL. Experienced in Machine-Learning algorithms (Gaussian Mixture (GMM) model, Random forest (RF) classifier method, convolutional neural network (CNN)) with Python.
- **Astronomy Software Skills:** AIPS, HIPE, GILDAS, CLASS, IRAF, CLUMPFIND, FELLWALKER, ASTRODENDRO, RADEX, CASSIS, DS9, TOPCAT, WCStools, SM, FV, MONTAGE, SEXTRACTOR, CASA, STARLINK, LSST Pipeline.
Basic knowledge in MHD simulation softwares Flash4.3 and RAMSES.
- **General Skills:** Good presentation skills. Works well in a team.

Observational and Data Analysis Experience

- Observations and analysis of low frequency radio interferometric data using GMRT for several observing runs since 2012.
- Observations and analysis of NIR imaging and spectroscopic data - 1.2 m Mt. Abu Infrared Telescope and 2 m Himalayan Chandra Telescope, India.
- Analysis of far-infrared and submillimeter data from PMO, TRAO, KVN, JCMT, and SEST-SIMBA.
- Analysis of single dish molecular line surveys from MALT90, FCRAO and ThrUMMS.
- Analysis of various archival data - Spitzer – IRAC, MIPS, WISE, PanSTARRS, 2MASS, UKIDSS, NEWFIRM, and Herschel, ATLASGAL+Planck.
- Analysis of optical data obtained from 8 m Subaru Hyper-Supreme Cam (HSC) using the LSST pipeline version 6.7.

Successful observing proposals

Radio observations

- IC1396: A site to investigate feedback mechanisms and subsequent star formation activity (PI for radio observations using GMRT, 2018).
- Bubbles as probes for star-formation and ISM (Co-PI for radio observations using GMRT, 2014).

Sub-mm observations

- Testing Dense Gas Star Formation Relations in the Outer Milky Way (Co-PI for molecular line observations using TRAO, Korea, 2019 and 2020). This is a large scale, ongoing survey program and we are allotted 175 and 350 hours of time during 2019 and 2020 runs, respectively.

Optical and NIR observations

- Environmental Impact on Circumstellar Disk Evolution: An HSC Survey of H α Emission Sources In Cygnus OB2 (Co-PI of the submitted proposal for optical observations using Hyper Supreme Cam of Subaru Telescope, 2020B)
- Near-infrared (NIR) spectral signatures of Extended Green Objects (EGOs) (PI for NIR observations using HCT, 2014)

- Near-infrared imaging and spectroscopic investigation of early phases in massive star formation (Co-PI for NIR observations using GIRT, Mount Abu 2014)

Publications

- Tracers of Dense Gas in the Outer Galaxy, Sudeshna Patra, Neal J. Evans II, Kee-Tae Kim, Mark Heyer, Jens Kauffmann, Jessy Jose, Manash R. Samal, and **Swagat R. Das** (Accepted for publication in AJ <https://arxiv.org/abs/2207.11613>)
- Subaru Hyper Suprime-Cam Survey of Cygnus OB2 Complex - I: Introduction, Photometry and Source Catalog, Saumya Gupta, Jessy Jose, Surhud More, **Swagat R Das** et al., MNRAS, 2021, 508, 3388
- Investigating star formation activity towards Galactic H II region IRAS 17149–3916, Ajay Potdar, **Swagat R Das**, Namitha Issac, Anandmayee Tej, Sarita Vig, C. H. Ishwara Chandra (Accepted for publication in MNRAS, 10.1093/mnras/stab3479)
- Sh 2-301: a blistered H II region undergoing star formation, Rakesh Pandey, Saurabh Sharma, Lokesh K. Dewangan, Devendra K. Ojha, Neelam Panwar, **Swagat Das**, D. P. Bisen, Arpan Ghosh, and Tirthendu Sinha (Accepted for publication in ApJ)
- Testing the star formation scaling relations in the clumps of the North American and Pelican nebulae cloud complex, **Swagat R Das**, Jessy Jose, Manash R Samal, Shaobo Zhang, and Neelam Panwar, MNRAS, 2021, 500, 3123
- Testing the role of environmental effects on the Initial Mass Function of low mass stars, Belinda Damian, Jessy Jose, Manash R. Samal, Estelle Moraux, **Swagat R Das**, Sudeshna Patra (Accepted for publication in MNRAS, <https://arxiv.org/abs/2101.08804>)
- Probing the Physical Conditions and Star Formation Processes in the Galactic H II Region S305, L. K. Dewangan, Saurabh Sharma, Rakesh Pandey, S. del Palacio, D. K. Ojha, P. Benaglia, and **Swagat R Das**, ApJ, 2020, 898, 172
- Radio and infrared study of southern H II regions G346.056–0.021 and G346.077–0.056, **Swagat R Das**, Anandmayee. Tej, Sarita Vig, Tie Liu, Swarna K. Ghosh, Ishwara Chandra C.H., A&A, 2018, 612, A36
- Infrared dust bubble CS51 and its interaction with the surrounding interstellar medium, **Swagat R Das**, Anandmayee Tej, Sarita Vig, Hong-Li Liu, Tie Liu, Swarna K. Ghosh, Ishwara Chandra C.H., MNRAS, 2017, 472, 4750
- Radio and infrared study of massive star forming region IRAS 20286+4105, Varsha Ramachandran, **Swagat R Das**, Anandmayee Tej, Sarita Vig, Swarna K. Ghosh, and Devendra K. Ojha , MNRAS, 2016, 465, 4753
- High-mass star formation toward southern infrared bubble S10, **Swagat R Das**, Anandmayee Tej, Sarita Vig , Swarna K. Ghosh, AJ, 2016, 152, 152

Papers to be submitted

- Kinematic analysis of IC 1396 complex and its sub-structures using Gaia-EDR3, **Swagat R Das**, Saumya Gupta, Prem Prakash, Jessy Jose, and Manah R Samal (under review in MNRAS)

- Exploring properties of the extreme low-mass population of IC 1396 using Subaru-HSC, **Swagat R Das**, Jessy Jose et al. (under preparation)
- Statistical study of cold dust emission in a sample of IR bubbles, **Swagat R Das**, Anandmayee. Tej et al. (under preparation)

Conferences and workshops

- Magnetic Fields and the Structure of the Filamentary Interstellar Medium Workshop organised by SOFIA Science center, June 2021.
- 38th Astronomical Society of India (ASI) Meeting, Tirupati, India, February 2020 (Poster presentation)
- 38th Astronomical Society of India (ASI) Meeting, Tirupati, India, February 2020, Astronomy Exposure Camp for Teachers (Invited talk)
- 2nd BINA workshop, Royal Observatory of Belgium, Brussels Belgium, October 2018 (Contributed talk)
- International conference on “Bubbles Big and Small, From supernovae & the Fermi bubble to the circumgalactic medium”, Indian Institute of Science (IISc), India, June 2018 (Contributed talk)
- 35th Astronomical Society of India (ASI) Meeting, Jaipur, India, March 2017 (Oral presentation)
- National conference on “Star and Planet Formation: Insights and Intricacies”, Indian Institute of Space science and Technology (IIST), India, December 2016 (Oral presentation)
- National Space Science Symposium, Vikram Sarabhai Space Centre (VSSC), India, February 2016 (Oral presentation)
- Workshop on “Current trends in Near Infrared Astronomy in India”, TIFR Balloon Facility, India, November 2014 (Poster presentation)
- Workshop on “TMT-India Science and Instrumentation”, IIST, India, June 2015
- Radio Astronomy School (RAS-2013), NCRA, India, August 2013
- 31st Astronomical Society of India (ASI) Meeting, Trivandrum, India, February 2013

Teaching experience and Student supervision

- Teaching assistant for the inter disciplinary undergrad course (IDC 111) at IISER, Tirupati for moonsoon and spring session of 2018 and 2019 for a batch of 120 students.
- Teaching assistant for the Mechanics Lab course for undergrads (PHY 122) at IISER, Tirupati for moonsoon session of 2019 and the spring session of 2020 for a batch of 120 students.
- Mentoring Ms. Saumya Gupta (Ph.D. student, IISER Tirupati) on Subaru analysis of Cygnus OB2 complex.
- Supervisor of Mr. Swatik Shinde (BS-MS student IISER Tirupati) for the summer internship project on “Exploring the star-formation activity of dense cores associated with infrared dark clouds (IRDCs)”.

- Mentor of Ms. Pratibha Saswal, for the semester project on “Young cluster membership using machine-learning (ML) applications with Gaia”.
- Co-supervisor of Mr. Ajay Potder (MS student IIST, Trivandrum) for his thesis “Multi-wavelength Study of Galactic Dust Bubble S6”

■ Organising Conferences and workshops

- Local coordinator for the Astronomy Exposure Camp for Teachers in the 38th Astronomical Society of India (ASI) Meeting, Tirupati, India, February 2020.
- Member of the local organising committee for the 38th Astronomical Society of India (ASI) Meeting, Tirupati, India, February 2020.
- Member of the local organising committee for the “Astronomy & Astrophysics School”, Indian Institute of Space science and Technology (IIST), India, 2012 – 2018.
- Member of the local organising committee for the “Recent Trends in the Study of Compact Objects: Theory and Observation (RETCO-III)”, Indian Institute of Space science and Technology (IIST), India, 2017.
- Member of the local organising committee for the National conference on “Star and Planet Formation: Insights and Intricacies”, Indian Institute of Space science and Technology (IIST), India, December 2016.
- Member of the local organising committee for the “TMT-India Science and Instrumentation Workshop”, Indian Institute of Space science and Technology (IIST), India, June 2015.
- Member of the local organising committee for the 31st Astronomical Society of India (ASI) Meeting, Trivandrum, India, February 2013.
- Member of the local organising committee for the “Solar Physics Workshop”, Indian Institute of Space science and Technology (IIST), India, December 2012 .