Jashanpreet Singh Dingra

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Amritsar, Punjab, India

Education

Guru Nanak Dev University - MSc. FYIP Physics - CGPA 8.60 **2024 – Present**
Amritsar, Punjab, India

The Millennium School - Non Medical - 82.4% **2022 – 2024**
Patiala, Punjab, India

The Kaintal School - Secondary Education - 94.4% **2010 – 2022**
Patiala, Punjab, India

Achievements

Academic Awards

- **ICNPA** (International Conference on Nuclear Physics and Application) **Best Contribution Award**. **(2024)**
- **JEE Mains** (Joint Entrance Examination) **AIR 231**. **(2024)**
- **NSEA** (National Standard Examination For Astronomy) **Scholar**. **(2023)**
- **IAAC** (International Astronomy and Astrophysics Competition) **Bronze Honours**. **(2021)**

Other Awards and Honours

- **IAAC** (International Astronomy and Astrophysics Competition) **Ambassador**. **(2024 - Present)**
- **ISRO** (Indian Space and Research Organisation) **Space Tutor**. **(2023 - Present)**
- **APY** (Astronomy Photographer of the Year) **Shortlisted**. **(2021)**
- **SDNP** (South Down National Park Astrophotography Competition) **Runner Up**. **(2021)**

Hackathons

- **HACKOWASP7.0** (North India's Biggest Hackathon, TIET) **Runner Up**. - 150000 INR **(2025)**
- **Ad Astra** (Natioanl Astronomy Ideathon, NIT, Jalandhar, Punjab) **Second Runner Up**. - 5000 INR **(2025)**
- **Technovista 2.0** (Ideathon, Guru Nanak Dev University) **Frist Prize**. - 1100 INR **(2025)**
- **Zinnovatio 2.0** (Hackathon, Chandigarh University) **Top 10 of 1500 Teams**. **(2025)**

Publications

Investigating the relationship between black hole mass and galaxy dynamics in Seyfert Type II and LINER galaxies **(Under Review)**

* Presented, for the first time, the correlation between $M_{\rm BH}$ and σ specifically for Seyfert Type II and LINER galaxies, an analysis made challenging due to obscuration by nuclear dust and the presence of a torus.
* *Authors: Jashanpreet Singh Dingra and Harjeet Kaur*
* *Submitted in the Monthly Notices of Royal Astronomical Society*

Galamo - an open-source Python package for comprehensive galaxy analysis **(Under Review)**

* Galamo is an open-source Python package for comprehensive galaxy analysis, integrating machine learning and statistical methods. It provides automated tools for morphology classification, kinematics, photometry, and spectral analysis to aid astrophysical research.
* *Authors: Jashanpreet Singh Dingra and Vikramjeet Singh*
* *Submitted to The Journal of Open Source Software (JOSS)*
* www.galamo.org

Other International Publications

Shortlisted in International Astronomy Photographer of the Year Award **(2021)**
*Published in : **The Forbes**, **The BBC**, **The Royal Museums Greenwich***

South Down National Park International Release **(2021)**

Recent Research Projects

Galspar & RAGA - Astronomy Pipelines for Galactic Morphological Study via GALFIT **(2025 - Present)**

* Developed 'galspar', its primary purpose is to perform precise photometric and morphological measurements on astronomical images of galaxies stored in the standard FITS (Flexible Image Transport System) format.
* Developed 'RAGA', for automative pipeline for statistically morphology study via GALFIT
* *Authors: Jashanpreet Singh Dingra, Hum Chand and Madhu Sudan (Department of Astronomical Sciences, Central University of Himachal Pradesh*

Measuring Stellar Velocity Dispersion of SDSS Galaxies using a MILES Template via our Fitting Pipeline: vdisp_fit **(2025 - Present)**

* Developed 'vdisp_fit', a Python pipeline to measure stellar velocity dispersion in galaxies using SDSS data.
* The method involves direct spectral fitting by convolving a MILES stellar template with a Gaussian broadening function and utilizes a robust χ^2 minimization to derive kinematic parameters.
* *Authors: Jashanpreet Singh Dingra and Gulab Chand Dewangan (IUCAA)*

Deep Learning Model for Alzheimer Detection and MRI Brain Segmentation **(2025)**

* Engineered a convolutional neural network (CNN) to classify Alzheimer's disease stages from brain MRI scans.
* The model also performs semantic segmentation to identify and delineate key brain structures affected by the disease, such as the hippocampus, to aid in early diagnosis.
* *Authors: Jashanpreet Singh Dingra and Hardeep Kaur*

Study of Stellar Dynamics of Open Star Clusters Using the Runge-Kutta Method **(2025)**

* Implemented an N-body simulation using the fourth-order Runge-Kutta method to model the gravitational interactions and long-term dynamical evolution of stars within open clusters.
* Analyzed stellar trajectories and cluster stability over cosmic timescales to understand dissolution processes.
* *Authors: Jashanpreet Singh Dingra and Suprit Singh (IIT Delhi)*

Crab Pulsar Spin Down Rate Over 5 Years (2015–2023) **(2024)**

* Analyzed archival X-ray timing data of the Crab Pulsar from 2015 to 2023 to precisely measure its spin-down rate and braking index.
* The study confirmed the expected rotational energy loss due to magnetic dipole radiation and investigated short-term timing noise and glitches.
* *Authors: Jashanpreet Singh Dingra, Pratham Jain (IIIT Raichur), Uttakarshika (IIIT Raichur) and Manam Tiwari (BNM Institute of Technology)*

Major Computational Astronomy Contributions

Astropy - Astrophysics and astronomy python package **(2025 - Present)**

* *Contributed in astropy.coordinates and many more*

Galspar & RAGA - Astronomy Pipelines for Galactic Morphological Study via GALFIT **(2025 – Present)**

* *Authors: Jashanpreet Singh Dingra, Hum Chand and Madhu Sudan (Department of Astronomical Sciences, Central University of Himachal Pradesh*

Measuring Stellar Velocity Dispersion of SDSS Galaxies using a MILES Template via our Fitting Pipeline: vdisp_fit **(2025 - Present)**

* *Authors: Jashanpreet Singh Dingra and Gulab Chand Dewangan (IUCAA)*

Galamo – A Python package for astronomy researchers for comprehensive galaxy analysis. **(2025)**

* *Founder: Jashanpreet Singh Dingra, Vikramjeet Singh (Guru Nanak Dev University)*

Conferences, Schools & Talks

4th BINA Conference, Kerala, India **(2025)**

AdventureX, China's Biggest Hackathon, Final Round, Hangzhou, China **(2025)**

Conference on Advances in Cosmology, Christ University, Bangalore **(2025)**

Summer School on Analysis and Statistical Modelling of Space Science Data, MCNS, Karnataka **(2025)**

ZTF Summer School 2025, University of Minnesota, USA **(2025)**

13th IIST Astronomy and Astrophysics School (IAAS), Kerala **(2025)**

Summer School on Gravitational-Wave Astronomy, ICTS-TIFR, Bangalore **(2025)**

National Conference on Active Galactic Nuclie, CUHP, India **(2025)**

Invited Speaker @ Star Party, The Millennium School, Patiala, Punjab **(2025)**

International Conference on Nuclear Physics and Its Applications, New Delhi **(2024)**

68th Symposium on Nuclear Physics, IIT Roorkee **(2024)**

Speaker at Astronomy Webinar, Astronomy Club, Kosovo **(2023)**

Pulsar Data Analysis, HEASARC (NASA), India **(2022)**

Investigations

SFR Correlation with the Mass and Metallicity of Galaxies from SDSS DR7 **(2023)**

Conducted an analysis revealing a positive correlation between the star formation rate (SFR) and the stellar mass of galaxies, indicating that more massive galaxies tend to have higher star formation rates. Also observed a positive correlation between galaxy mass and metallicity, suggesting that massive galaxies are typically more metal-rich.

Correlation Between the Recessional Velocity and Distance of Type Ia Supernovae **(2022)**

Identified a strong positive correlation between the distance of a Type Ia supernova and its recessional velocity, consistent with Hubble's Law. Notably discovered a supernova with a recessional velocity of $0.8c$, located approximately 1000–1500 Mpc away.

Simulation that Predicts Mars Oppositions **(2020)**

Developed a Python-based simulation to predict Mars oppositions over the next 100 years, aiding in observational planning and planetary alignment studies.

24-Hour Sun Analysis from SDO Data **(2020)**

Analyzed solar activity using 24-hour observational data from the Solar Dynamics Observatory (SDO) on December 26, 2020, focusing on sunspot activity and solar flares.

Extra Projects

Web Development: International Music Academy - Gurmat Sangeet Taksal **(2024)**

Web Development: Relegious Place - Gurdwara Saheedgarh Sahib, Hamilton, Ontario, Canada **(2024)**

Rocket Flight Computer **(2023)**

Capable of telemetry up to 7 km, equipped with an accelerometer, gyroscope, temperature sensors for the abort system, GPS modules, barometric sensors, servos, and biological slides for microbial collection from the toposphere.

Leadership / Social Work

Recognized by the Municipal Commissioner for heroically saving a child during a bus accident.

Member of the Art of Living's Punjab Flood Relief Team.

Tech Head of Guru Nanak Dev University Physics Club

Founder of Dingrastro Club, a global astronomy community with over 200 members.

Active Member of Over 7 Astronomy Clubs Worldwide

Technical Skills

Languages: Julia, Matlab, Python, R, HTML, CSS, JavaScript, PHP, C++ and SQL

Skills: Astronomy Data Analysis (Aladin, TopCat, DS9, VIREO, IRAC, etc), Scientific Educator, Web Development and Cooking