PRATISHTHA RAWAT

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RESEARCH INTERESTS

Keywords: Planetary Systems, Planet Formation, Exoplanetary Astrophysics, Exoplanet Atmospheres, Exomoons, Habitability, Star formation and Evolution.

I enjoy studying the theoretical and observational aspects of Exoplanets. My current research envelopes Planet Formation, Planetary System Architecture, and Classification. In my current role, I develop tools which allow a comparison between theoretical models of planet formation and transit observations. Other interests include direct detection techniques, exoplanet atmospheres, exomoons, stellar astrophysics etc.

EDUCATION

University of Geneva, Geneva, Switzerland   Sept. 2020 - Jul. 2022
Master of Science in Astrophysics, Department of Astronomy
Thesis: Exploring multi-planetary systems, Advisors: Stéphane Udry, Lokesh Mishra

R.V. College of Engineering, Bangalore, Karnataka, India   Aug. 2016 - Jul. 2020
Bachelor of Engineering (First Class with Distinction), Department of Aerospace Engineering

RESEARCH EXPERIENCE

- Exploring multi-planetary systems – Thesis   Aug. 2021 - Aug. 2022
  University of Geneva, Advisors: Stéphane Udry, Lokesh Mishra
  - Developed a code that mimics transit surveys to *theoretically observe* a synthetic planetary population.
  - Improved stellar properties of the Kepler DR25 catalogue by cross-matching it with the Berger Gaia-Kepler catalogue and utilized transit durations to derive the eccentricity distribution of planetary candidates.
  - Investigated the relation between eccentricity and multiplicity for synthetic, theoretically observed and Kepler observed planetary candidates. Identified an anti-correlation rather than presence of dichotomous populations.
  - Classified the architecture of synthetic and theoretically observed planetary populations using a novel framework and further analyzed the eccentricity distributions from a theoretical perspective.

- Nucleosynthesis from Homogeneously evolving stars – Astrophysics Lab   Feb. 2021 - Jun. 2021
  University of Geneva, Advisors: Georges Meynet, Facundo D Moyano
  - Constructed a relatively simple and computationally swift model to illustrate chemically homogeneous evolution and reproduced the blueward evolution of homogeneous stars in the Hertzsprung–Russell diagram.
  - Explored ways to test all assumptions in the method and uniquely used other literature to test the precision of the methods used.
  - Estimated the amount of H and He lost to stellar winds by massive stars to comment on their nucleosynthesis.

- Transit Photometry – Observations, data acquisition and analysis module   Feb. 2021 - Jun. 2021
  University of Geneva, Advisor: Monika Lendl
  - Utilized data from EulerCam, the CCD camera of at the 1.2m Euler telescope at La Silla observatory (Chile) and performed aperture photometry to reduce photometric observations of a planetary transit.
  - Automated the routine to perform time-series photometry on the target star. Further, used reference stars to create a normalized, relative photometric light curve.
  - Analyzed the final transit light curve of WASP-52 to extract parameters of the transiting exoplanet.

- Dust Attenuation from Early Universe galaxies– Astrophysics Lab   Sept. 2020 - Jan. 2021
  University of Geneva, Advisors: Pascal Oesch, Laia Barrufet De Soto
  - Compiled a sample of 105 galaxies at redshifts $z = 4 - 6$ with photometric measurements from the ALPINE survey in the COSMOS field to investigate the effects of dust on the stellar continuum of high-redshift galaxies.
  - Modelled and fitted the spectral energy distributions of star-forming galaxies to extract physical quantities.

- Reconstructed the dust attenuation curve for ~0.9-1.5 Gyr of cosmic history and explored the effect of changing attenuation laws in the computation.

PAPER PUBLICATIONS (●) AND PRESENTATIONS (○)

- A framework for characterizing the architecture of exoplanetary systems 3. Approaching the Kepler dichotomy. **Rawat** et al.; in prep.

○ Theoretical perspectives on the architecture of planetary systems: Orbital Shapes   Jul. 2022
  Rawat Pratishtha, Mishra Lokesh, Udry Stéphane
  Poster, Sagan Summer Workshop: Exoplanet Science in the Gaia Era, NASA Exoplanet Science Institute (NexSci)

● CFD Analysis to study Flow Separation using a Plasma Jet Actuator for Non-Cambered Airfoil   Sept. 2020
  M. Mukesh, Javaria Gunjan, Mahawar Vaibhav, **Rawat, Pratishtha** & Kumar, Hemantha
  GIS-SCIENCE Journal, Vol. 7, Issue 8, ISSN 1869-9391.

○ Characterization and Detection of Exoplanets – Significance Methodologies and Developments   Sept. 2019
  Rawat, Pratishtha
  Planetary Symposium, Italian Association of Aeronautics and Astronautics (AIDAA) XXV International Congress, Rome, Italy.

● Acquisition and Actuation Modelling of RVSAT-1   Jun. 2018
  Rawat, Pratishtha & Dandwani, Rachna
  International Journal of New Technologies in Science and Engineering, Vol. 5, Issue 4, ISSN 2349-0780.

WORKSHOPS, CONFERENCES AND SEMINARS

- 2022 Sagan Summer Workshop: Exoplanet Science in the Gaia Era, NexSci   Jul. 2022
- 2021 Sagan Summer Workshop: Circumstellar Disks and Young Planets, NexSci   Jul. 2021
- Astrophysics Colloquium, University of Geneva   Sept. 2020 - Present
- Exoplanet Seminars, University of Geneva   Sept. 2021 - Present
- Workshop: Soft Skills for an Astronomer's career, University of Geneva   Oct. 2021 – Jul. 2022
- PLATO Mission Conference 2021: Exploring exoplanets in the habitable zone of solar-like stars   Oct. 2021
- 'Core Python for Data Science' Bootcamp, Learnbay   May 2021

GRANTS AND AWARDS

- Travel Support by Jet Propulsion Laboratory (JPL), NASA Exoplanet Science Institute (NexSci)   Jul. 2022
- Student Scholarship, Young Innovators Support initiative by Faith Builders ($1000)   Jun. 2018
- Funding for organizing Seminars/Events, Department of Aerospace Engineering, RVCE ($500)   2017 - 2019
- Academic Excellence Trophy, LKS Senior Secondary School   2016
- Study Scholarship, Vector Academy ($1200/year)   2014 - 2016

SKILLS

- **Software**
  SAOImageDS9, Code Investigating GALaxy Emission (CIGALE), Data and Analysis Center for Exoplanets (DACE), CATIA V5, ANSYS, SolidWorks, MATLAB, Adobe XD, Microsoft Office, Geogebra Classic

- **Languages**
  Python, Fortran, C, MATLAB, LaTeX

OTHER INTERESTS: SCIENCE COMMUNICATION

- Volunteer for the "Space Village", Swiss ComicCon 2022   May 2022
  National Centre of Competence in Research PlanetS (NCCR PlanetS), Switzerland
  Representing NCCR PlanetS, I explored interesting and thought-provoking science with visitors using several exhibits on planetary science and astronomy.

- Volunteer for LIGO-INDIA, Vigyaan Samagram 2019   Sept. 2019
  Department of Atomic Energy, Department of Science and Technology, National Council of Science Museums
  I curated events, talks and demonstrations for the LIGO collaboration at India's first Mega-Science exhibition.

- Event Organizer: Seminars, workshops and lectures on Astronomy and Aerospace   Aug. 2016 - Jun. 2020
  R.V. College of Engineering, Bengaluru, India