

Dr. Jayesh M Goyal

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INFORMATION National Institute of Science Education & Research www.jmgoyal.com
(NISER), Bhubaneswar - Odisha 752050, India

EDUCATION **University of Exeter**, Exeter, U.K

Ph.D., Astrophysics, July 2019

- Advisors: Prof. Nathan Mayne, Prof. David Sing and Dr. Benjamin Drummond
- Thesis : *Atmospheric Library of Far Away Worlds* - PhD research involved developing atmosphere models to interpret observations of exoplanet atmospheres. This involved developing opacity database for models, parameterising physical processes, testing the effects of different planetary properties on their observational spectral features. We developed a publicly available library of simulated observations *Atmospheric Library of Far Away Worlds* which has led to many exciting discoveries, and also been used extensively to interpret and plan observations.

Indian Institute of Science (IISc), Bangalore, India

M.Tech., *Climate Science*, 2014, First Class With Distinction

- Advisor: Prof. J. Srinivasan and Prof. S.K.Satheesh
- Thesis : *Exploring the Potential of SAPHIR Instrument Onboard Megha-Tropiques to Retrieve Rainfall Characteristics*

University of Pune, Pune, India

B.E., Mechanical Engineering, 2012, First Class With Distinction

EXPERIENCE **Assistant Professor** June 2021 to now

**School of Earth & Planetary Sciences (SEPS),
NISER, India**

Research - Planetary and Exo-Planetary Atmospheres, Radiative Transfer, Remote Sensing, Climate Science.

Research Associate (Postdoctoral Fellow) Sept. 2019 to June 2021

**Carl Sagan Institute,
Department of Astronomy, Cornell University, USA**

Supervisor: Prof. Nikole Lewis

Research - Developing forward and retrieval models to interpret observations of planetary atmospheres and preparing for JWST mission.

Visiting Researcher February 2018

Space Telescope Science Institute (STScI), Baltimore, USA

Supervisor: Prof. Nikole Lewis and Dr. Hannah Wakeford

Research - Developing generic grid of models for Exoplanet Atmospheres.

Research Assistant

Aug. 2014 to July 2015

Divecha Centre for Climate Change (DCCC),

Indian Institute of Science (IISc)

Supervisor: Prof. J. Srinivasan

Research - Satellite Meteorology and Research Field Campaign.

PUBLICATIONS

1. **Goyal, J. M.**; et.al. 2020, [A Library of Self-Consistent Simulated Exoplanet Atmospheres](#), **MNRAS**, **498**, **4680-4704**
2. **Goyal, J. M.**; et.al. 2019, [Fully scalable forward model grid of exoplanet transmission spectra](#), **MNRAS**, **482**, **4**, **4503-4513**
3. **Goyal, J. M.**; et.al. 2018, [A library of ATMO forward model transmission spectra for hot Jupiter exoplanets](#), **MNRAS**, **474**, **4**, **5158-5185**
4. MacDonald, R. J.; **Goyal, J. M.**; Lewis, N. K.; 2020, [Why Is it So Cold in Here? Explaining the Cold Temperatures Retrieved from Transmission Spectra of Exoplanet Atmospheres](#), **ApJ**, **893**, **2**, **L43**
5. Evans, T. M.; Sing, D. K.; Kataria, T; **Goyal, J.M.**; et.al. 2017, [An ultrahot gas-giant exoplanet with a stratosphere](#), **Nature**, **548**, **58-61**
6. Evans, T. M.; Sing, D. K.; **Goyal, J.M.**; et.al. 2018, [An optical transmission spectrum for the ultra-hot Jupiter WASP-121b measured with the Hubble Space Telescope](#) , **AJ**, **156**, **6**, **283**
7. Nikolov, N.; Sing, D. K.; Fortney, J; **Goyal, J. M.**; et.al. 2018, [An absolute sodium abundance for a cloud-free ‘hot Saturn’ exoplanet](#), **Nature**, **557**, **526-529**
8. Nikolov, N.; Sing, D. K.; **Goyal, J.M.**; et.al. 2018, [Hubble PanCET: an isothermal day-side atmosphere for the bloated gas-giant HAT-P-32Ab](#), **MNRAS**, **474**, **2**, **1705-1717**
9. Lewis, N. K.; Wakeford, H. R.; MacDonald, R. J.; **Goyal, J.M.**; et.al. 2020, [Into the UV: The Atmosphere of the Hot Jupiter HAT-P-41b Revealed](#), **ApJL**, **902**, **L19**
10. Alam, M.; Nikolov, N.; Lopez Morales, M.; Sing, D.K.; **Goyal, J.M.**; et.al. 2018, [The HST PanCET program: Hints of Na I & Evidence of a cloudy atmosphere for the inflated hot Jupiter WASP-52b](#), **AJ**, **156**, **6**, **298**
11. Lines, S.; Manners, J.; Mayne, N. J.; **Goyal, J.M.**; et.al. 2018, [Exonephology: transmission spectra from a 3D simulated cloudy atmosphere of HD 209458b](#), **MNRAS**, **481**, **1**, **194-205**

12. Wakeford, H. R.; Sing, D. K.; Deming, D.; Lewis, N. K.; **Goyal, J.M.**; et.al. 2018, [The Complete Transmission Spectrum of WASP-39b with a Precise Water Constraint](#), **AJ**, **601**, **1**, **29**
13. Drummond, B.; Mayne, N. J.; Baraffe, I.; Tremblin, P.; Manners, J.; Amundsen, D. S.; **Goyal, J.M.**; et.al. 2018, [The effect of metallicity on the atmospheres of exoplanets with fully coupled 3D hydrodynamics, equilibrium chemistry, and radiative transfer](#), **A&A**, **612**, **A105**
14. Drummond, B.; Mayne, N. J.; Manners, J.; Baraffe, I.; **Goyal, J.M.**; et.al. 2018, [The 3D thermal, dynamical and chemical structure of the atmosphere of HD 189733b: implications of wind-driven chemistry for the emission phase curve](#), **ApJ**, **869**, **1**, **28**
15. Lines, S.; Mayne, N. J.; Boutle, I. A.; Manners, J.; Lee, G. K. H.; Helling, Ch.; Drummond, B.; Amundsen, D. S.; **Goyal, J.M.**; et.al. 2018, [Simulating the cloudy atmospheres of HD 209458 b and HD 189733 b with the 3D Met Office Unified Model](#), **A&A**, **615**, **A97**
16. Spake, J. J.; Sing, D. K.; Evans, T. M.; Oklopčić, A.; Bourrier, V.; Kreidberg, L.; Rackham, B. V.; Irwin, J.; Ehrenreich, D.; Wyttenbach, A.; Wakeford, H. R.; Zhou, Y.; Chubb, K. L.; Nikolov, N.; **Goyal, J.M.**; et.al. 2018, [Helium in the eroding atmosphere of an exoplanet](#), **Nature**, **557**, **68-70**
17. Bean, J.; Stevenson, K.; et.al. 2018, [The Transiting Exoplanet Community Early Release Science Program for JWST](#), **PASP**, **557**, **68-70**
18. Boutle, I.; Mayne, N. J.; Drummond, B.; Manners, J.; **Goyal, J.M.**; et.al. 2017, [Exploring the climate of Proxima B with the Met Office Unified Model](#), **A&A**, **601**, **A120**
19. Piyush, D.; **Goyal, J.M.**; Srinivasan, J., 2017, [Retrieval of cloud ice water path using SAPHIR on board Megha-Tropiques over the tropical ocean](#), **AdSpR**, **59**, **7**, **1895-1906**
20. Drummond, B.; Tremblin, P.; Baraffe, I.; Amundsen, D. S.; Mayne, N. J.; Venot, O.; **Goyal, J.M.**; 2016, [The effects of consistent chemical kinetics calculations on the pressure-temperature profiles and emission spectra of hot Jupiters](#), **A&A**, **594**, **A69**
21. For complete list see [NASA ADS LINK](#)

SELECTED PROPOSALS

1. HST Cycle 25 (PID - 15469)(Co-I, PI - Nikolay Nikolov) - Characterizing a new prototype Saturn-mass exoplanet with the clearest atmosphere yet.
2. JWST DDT ERS (JWST PID - 1366) (Co-I, PI - Natalie Batalha) - The Transiting Exoplanet Community Early Release Science Program
3. HST Cycle 25 (PID - 15288) (Co-I, PI - David Sing)- How small and how high? Enabling UV exoplanet cloud and exosphere science with WFC3/UVIS
4. HST Cycle 25 (PID - 15135) (Co-I, PI - Tom Evans)- An exoplanet with a stratosphere: seeking the unknown absorber
5. Spitzer DDT (PID - 13245) (Co-I, PI - Jonathan Fraine)- Maximising JWST GTO Observations of HAT-P-26b with Time-Critical Spitzer Eclipse Measurements
6. ESO Large Programme Period 99A (Co-I, PI - Nikolay Nikolov)- From hot gas-giants to cooler rocky exo-Earths: The first large-scale comparative exoplanet atmospheric survey with FORS2
7. HST Cycle 24 (PID - 14916)(Co-I, PI - Jessica Spake) - Probing methane chemistry in a newly-discovered warm gas giant before JWST

REVIEWER

- Astrophysical Journal (ApJ) 2019 - present
- Monthly Notices of the Royal Astronomical Society (MNRAS) 2019 - present

PROFESSIONAL MEMBERSHIP

- Fellow of the Royal Astronomical Society (FRAS)

FIELD EXPERIENCE

- 3 week research field campaign in Aug. 2014 onboard ocean research vessel Sagar Nidhi as part of Ocean Mixing and Monsoon (OMM) mission (PI - M.Ravichandran) **INCOIS** to understand upper ocean physics and air-sea interaction in the Bay of Bengal. Major tasks included launching Radiosondes, installing weather stations, deploying CTD instruments and aerosol measuring instruments.

AWARDS

Conference and Travel Awards

- Rocky Planets in the Era of JWST Conference, NASA GSFC, Greenbelt, MD, USA Nov. 2019
- Les Houches Winter school on Planetary Atmospheres, Les Houches, France March 2017
- Sagan Summer Workshop, Pasadena, CA, USA July 2016

- American Geophysical Union (AGU),
San-Francisco, CA, USA Dec 2014
- International Summer School, University of Exeter, U.K July 2013

Student Awards

- Winner of 3 Minute Wonder 2015 England South
West Region and National Finalist 2015-16 ([Video Link](#))
- University of Exeter and Leverhulme Trust
PhD Scholarship. Sept. 2015 to March 2019
- Jeremy Grantham Fellowship Jan. 2013 to July 2014
- Government of India Master's Scholarship Aug. 2012 to July 2014
- 3rd Best Poster Prize International
Geosphere Biosphere Programme April 2014

- PRESENTATIONS
- NISER, Bhubaneshwar, Orissa, India July 2020
Talk - Exoplanets and the Search for Habitable Worlds
 - Rocky Planets in the Era of JWST Conference
NASA GSFC, Greenbelt, MD, USA Nov. 2019
Talk - Atmospheric Library of Far Away Worlds
 - BDEXOCON 3 Conference, University of Delaware
Newark, DE, USA Oct. 2019
Talk - A Library of Self-Consistent Simulated Exoplanet Atmospheres
 - SpaceX Student Conference, Exeter, UK April 2018
Talk - Exoplanets and the Search for Habitable Worlds ([Video Link](#))
 - EWASS 2018 , Liverpool, UK April 2018
Talk - Atmospheric Library of Far Away Worlds
 - Exeter Astrophysics Seminar , University of Exeter, UK Sept. 2017
Talk - Atmospheric Library of Far Away Worlds
 - Dirac Day 2017 , University of Exeter, UK Aug. 2017
Talk & Poster - Atmospheric Library of Far Away Worlds
 - Gas Analysis and Sensing Group Colloquium ,
University of Southampton, UK April 2017
Talk - Exoplanets and the Search for Habitable Worlds
 - UK Exoplanet Meeting 2017 Poster Presentation,
University of St. Andrews, UK March 2017
*Poster - Exploring Exoplanet Atmospheres Using
Multi-Planet Model Grid*
 - Les Houches Winter school on Planetary Atmospheres,
Les Houches, France March 2017
Poster - Exploring the Atmospheres of Alien Worlds
 - Sagan Summer Workshop Poster Presentation,
Pasadena, CA, USA July 2016
Poster - Exploring the Atmospheres of Alien Worlds
 - UK Met Office Academic Partnership (MOAP)

	Poster Presentation, Exeter, UK	Feb 2016
	<i>Poster - Exploring the Atmospheres of Alien Worlds (Focused on Unified Model)</i>	
	• AGU Poster Presentation, San-Francisco, CA, USA	Dec 2014
	<i>Poster - Can Saphir Instrument Onboard Meghatropiques Retrieve Hydrometeors and Rainfall Characteristics?</i>	
	• IGBP Symposium, Bangalore, India	April 2014
	<i>Talk - Rainfall characteristics and estimation from Saphir onboard Meghatropiques</i>	
PUBLIC OUTREACH	• Pint of Science 2018 Talk, Exeter, UK	May 2018
	• Dartmoor Dark Skies Outreach Event, Haytor, UK	April 2018
	• Astrophysics Elevator Pitch (Video Link)	Nov. 2017
	• Think...Art - Combining Arts and Science, University of Exeter, UK	June 2017
	• @Bristol Science Museum Theme Day Is there anybody out there ?, Bristol, UK	June 2017
	• Institute of Physics (IOP) Festival of Physics, Exeter, UK	Nov 2016 & 2015
	• Big Bang Fair Southwest, Exeter, UK	June 2016
	• Normal Lockyer Observatory, Sidmouth, UK	Jan 2016
	• Stargazing Night, Exeter, U.K	Jan 2016
	• Westgate Science Club Festival, Exeter, UK	Nov 2015
	• IISc Open Day, India	March 2015
	• Climate Science Quiz, Bangalore, India	Sep 2013 & 2014
	• Primary and Secondary Schools in India	
TEACHING EXPERIENCE	Principal Instructor - School of Earth & Planetary Science, NISER	
	• EP 642 - Programming and Numerical Techniques for Earth & Planetary Sciences	Fall 2021
	Co-demonstrator - School of Physics, University of Exeter	
	• PHY 2026 - Stage 2 Astro Observing Supervisor	2015-16, 2016-17
	• PHY 1029 - IT and Astrophysics Skills	2015-16, 2016-17
	• PHY1027 - Practical Physics Laboratory 1	2016-17, 2017-18
	• PHY 2026 - Practical Physics Laboratory 2	2015-16

SKILLS

- Scientific - Using and developing atmospheric models - 1D Forward and Retrieval, 3D GCM Models, Radiative transfer, Line-list integration, Exoplanet Atmospheres Data Reduction, Satellite Meteorology and Remote Sensing.
- Computational - Fortran, Python, Matlab, IDL, HTML, Website development, HPC Systems, UNIX, Mac, Bash Script, Big data creation and analysis
- Experimental - Radiosonde Launching, Weather station maintenance
- Soft Skills - Conference and Outreach Event Management

REFERENCES

Prof. Nathan Mayne

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School of Physics, E-mail: N.J.Mayne@exeter.ac.uk
University of Exeter, UK

Prof. David Sing

Bloomberg Distinguished Professor,
John Hopkins University, E-mail: dsing@jhu.edu
Baltimore, USA

Prof. Nikole Lewis

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Department of Astronomy, E-mail: nkl35@cornell.edu
Cornell University, Ithaca, USA