

# NIRAJ KUSHWAHA

## PHD CANDIDATE

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nirajkushwaha.github.io

### ABOUT ME

Hello! I am Niraj from India and currently living in Vienna. I am a PhD candidate at the Complexity Science Hub, exploring nature and society from a physics lens. With a background in physics (BSc, MSc), I apply concepts from statistical physics, mathematical modelling, data science, and machine learning to uncover patterns in complex systems—from armed conflicts to internal migration—always aiming for real-world impact. My research, recognized through various awards, publications, and conference participation, bridges fundamental science with societal relevance. I'm passionate about using complexity science for meaningful change and I am always eager to connect with those curious about networks, physics, and innovative approaches to understanding the world.

### RESEARCH EXPERIENCE

#### PHD CANDIDATE

( 2021 - Present )

Complexity Science Hub and University of Vienna

- Dual affiliation with Complexity Science Hub and the University of Vienna.
- Working on multiple projects ranging from armed conflict dynamics to internal displacement and migration.
- Good track record of publications with two papers out so far.
- I have demonstrated good communication skills having attended more than 8 conferences so far.
- My research has appeared on multiple media platforms including BBC radio and Austrian Press Agency (APA).

#### MASTER THESIS

( 2019 - 2020 )

Indian Institute of Technology (IIT), Indore

- One of the highest-scoring theses from my cohort.
- The project culminated in a publication.
- Worked on implementing machine learning techniques for identifying synchronized vs chimera states in Kuramoto networked systems.
- Other minor side-projects include crop classification using satellite images and credit card fraud detection.

#### INTERNSHIP

( 2018 )

Bhabha Atomic Research Center

- Interned at the Astrophysical Sciences Division of Bhabha Atomic Research Center.
- Worked on analytical calculations for synchrotron emission by charged particles in non-uniform magnetic fields such as supernovas.
- Also performed data analysis on radiation data from the Major Atmospheric Cerenkov Experiment Telescope (MACE).

### EDUCATION

#### PHD IN PHYSICS (PURSUING)

( 2021-Present )

University of Vienna

#### MASTER OF SCIENCE IN PHYSICS

( 2018 - 2020 )

Indian Institute of Technology (IIT), Indore

#### BACHELOR OF SCIENCE (HONOURS) IN PHYSICS

( 2015-2018 )

Institute of Science BHU, Varanasi

### PUBLICATIONS

- **Kushwaha, Niraj**, et al. "Common indicators hurt armed conflict prediction." arXiv preprint arXiv:2503.00265 (2025). ([Link](#))
- **Kushwaha, Niraj**, and Edward D. Lee. "Discovering the mesoscale for chains of conflict." PNAS nexus 2.7 (2023): pgad228. ([Link](#))
- **Kushwaha, Niraj**, et al. "Machine learning assisted chimera and solitary states in networks." Frontiers in Physics 9 (2021): 513969. ([Link](#))

## ACADEMIC ACHIEVEMENTS

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### AWARDS

- Runner-up winner of the "Bertalanffy Doctoral Student Award 2025" by Complex Systems Society France.
- "Significant Milestone Award of the 2023 Exner Lectures in the category of PhD" by The Exner Foundation.
- Gold medal in National Science Olympiad conducted by All India Science Teacher's Association.

### NATIONAL LEVEL EXAMS

- Top 1% national level topper (All India Rank=66) in National Graduate Physics Examination-2018.
- All India Rank=432 (out of around 14000 applicants) in the national entrance exam for the Indian Institute of Technology in 2018.

### TALKS AT CONFERENCES

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CONFERENCE ON COMPLEX SYSTEMS (CCS)	( 2020 )
THE GERMAN PHYSICS SOCIETY CONFERENCE	( 2022 )
CONFERENCE ON COMPLEX SYSTEMS (CCS)	( 2022 )
THE GERMAN PHYSICS SOCIETY CONFERENCE	( 2023 )
NETSCI CONFERENCE	( 2023 )
CONFERENCE ON COMPLEX SYSTEMS (CCS)	( 2023 )
THE GERMAN PHYSICS SOCIETY CONFERENCE	( 2024 )
NETSCIX CONFERENCE	( 2025 )
THE GERMAN PHYSICS SOCIETY CONFERENCE	( 2025 )
INTERNATIONAL CONFERENCE ON COMPUTATIONAL SOCIAL SCIENCE	( 2025 )

### MEDIA APPEARANCE

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#### ARTICLES

- The Military's Recruitment of AI Has Already Begun. ([Link](#))
- Forscher beobachten "Lawinen" bei Ausbreitung bewaffneter Konflikte. ([Link](#))
- Scientists develop method to predict the spread of armed conflicts. ([Link](#))

#### AUDIO/VIDEO

- I gave a live interview at the BBC newscast radio show. ([Link](#))
- Our paper was featured in Sabine Hossenfelder's science news. ([Link](#))

### OTHER ACTIVITIES

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#### POSITIONS OF RESPONSIBILITIES

- PhD representative at the Complexity Science Hub Vienna (one term)
- Climate counsellor appointed by the International Centre for Culture and Education at BHU (one term)
- House captain during school (one year)

#### VOLUNTEERING WORK

- Volunteered at the Buddy Project, Vielmehr für Alle! in Vienna
- Started a small organization with college friends at BHU to educate underprivileged kids in Varanasi