NIRAJ
KUSHWAHA

BASIC INFO

DOB	24/02/1997
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CURRENT POSITION

RESIDENT SCIENTIST / PHD CANDIDATE   2021-
Complexity Science Hub Vienna | *Josefstädter Str. 39, 1080 Vienna*
(Supervisor: Dr. Edward D. Lee, Prof. Stefan Thurner)

- Discovering mesoscale for chains fo armed conflicts
- Building dynamical models to explain population-level scaling in sessile organisms
- Joint affiliation with the Department of Physics, University of Vienna (Supervisor: Prof. Christoph Dellago)

EDUCATION

MSc. in PHYSICS   2018-2020
Indian Institute of Technology (IIT) Indore | *Khandwa Rd, Simrol, Madhya Pradesh 453552*

- Thesis topic: "Engineering chimera and novel technique based on machine learning"
- Minor project on, "Crop classification using satellite imagery"
- Minor project on, "Credit card fraud detection"

BSc. in PHYSICS (HONS.)   2015-2018
Institute of Science- BHU | *Ajagara, Varanasi, Uttar Pradesh 221005*

High school diploma   2014
Atomic Energy Central School | *Tarapur, India*

INTERNSHIP AND RESEARCH VISITS

RESEARCH VISIT   2026 (Upcoming)
The Department of Systems Design Engineering, University of Waterloo | *Waterloo, Canada*
(PI: Dr. Woi Sok Oh)

- 4 month long research visit Funded by University of Waterloo and YrCCS

RESEARCH VISIT   2025
ETH Zurich | *Zurich, Switzerland - 8092*
(PI: Prof. Lars-Erik Cederman)

- Research visit for a week

RESEARCH VISIT   2024
Complexity Science research group, Universität Potsdam | *Potsdam, Germany - 14476*
(PI: Prof. Karoline Wiesner)

- Research visit for a week

MASTER THESIS INTERN   2019-2020
Complex Systems Lab, IIT Indore | *Indore, India - 453552*
(Supervisor: Prof. Sarika Jalan)

- Worked on my master thesis for a year

WINTER INTERN   2018
Astrophysical Sciences Division, Bhabha Atomic Research Station | *Mumbai, India - 400094*
(Supervisor: Mr. Bitan Ghosal)

- Main project topic: "Synchrotron emission by charged particles in a non-uniform magnetic field"
- Minor project on data analysis of radiation data from "Major Atmospheric Cerenkov Experiment Telescope"

ACHIEVEMENTS

National level exams
- Top 1% national level toppers (All India Rank=66) in National Graduate Physics Examination-2018
- All India Rank=432 in the national entrance exam for the Indian Institute of Technology in 2018

Awards and grants
- Winner of the yrCCS Bridge Grant 2025
- Runner-up winner of the Bertalanffy Doctoral Student Award 2025 given be the 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

PUBLICATIONS

Articles

Kushwaha, Niraj and Edward D Lee (Aug. 2023). "Discovering the mesoscale for chains of conflict". In: *PNAS Nexus* 2.7, pgad228. ISSN: 2752-6542. DOI: 10.1093/pnasnexus/pgad228.

Kushwaha, Niraj, Naveen Kumar Mendola, Saptarshi Ghosh, Ajay Deep Kachhvah, and Sarika Jalan (2021). "Machine learning assisted chimera and solitary states in networks". In: *Frontiers in Physics* 9, p. 513969.

Kushwaha, Niraj, Woi Sok Oh, Shlok Shah, and Edward D Lee (2025). "Data-driven conflict classification exposes weak predictive indicators". In: *Royal Society Open Science* 12.12.

CONFERENCES

INTERNATIONAL CONFERENCE ON COMPUTATIONAL SOCIAL SCIENCE   2025
Norrköping, Sweden

- Gave a talk.

THE GERMAN PHYSICS SOCIETY MEETING   2025
Regensburg, Germany

- Gave a talk titled, "Common Indicators Hurt Armed Conflict Prediction".

NETSCIX   2025
Indore, India

- Gave a talk titled, "The Triangle of Madness (Using causal network to uncover types of armed conflict)".

AI FOR DEVELOPING COUNTRIES FORUM (AIFOD)   2024
Vienna, Austria

- Attended as an invited delegate.

THE GERMAN PHYSICS SOCIETY MEETING   2024
Berlin, Germany

- Gave a talk titled "Conflict Classification Using Multinomial Mixture Models and Conflict Avalanches"

CONFERENCE ON COMPLEX SYSTEMS   2023
Salvador, Brazil

- Gave two talks, "From Narrative to Systematic Scales of Conflicts" and "Systematic Procedure for Extracting Causal Connections in Conflict Cascades"

NETSCI   2023
Vienna, Austria

- Volunteer with the organization team.

THE GERMAN PHYSICS SOCIETY MEETING 2023
Dresden, Germany

- Gave a talk titled "Population waves in sessile organisms"

CONFERENCE ON COMPLEX SYSTEMS (CCS) 2022
Palma de Mallorca, Spain

- Gave a talk titled "Multiscale causal structure in armed conflicts"
- Presented a poster

THE GERMAN PHYSICS SOCIETY MEETING 2022
Regensburg, Germany

- Gave a talk titled "Multiscale causal structure in armed conflicts"

CONFERENCE ON COMPLEX SYSTEMS (CCS) 2020
Online

- Gave a talk titled "Machine Learning assisted Chimera states in Networks"

UN 75 DIALOGUE 2020
Online, India

- Gave a talk at a local chapter of the UN 75 dialogues.

HARVARD COLLEGE US-INDIA INITIATIVE 2017
Mumbai, India

- Delegate

SCHOOLS AND WORKSHOPS

COMPLEXITY SCIENCE APPROACHES TO DEMOCRACY DECLINE AND CIVIL CONFLICT 2025
Vienna, Austria

UNDERSTANDING DEMOCRATIZATION AND CIVIL WAR WITH STATISTICAL PHYSICS 2025
Vienna, Austria

- Gave an invited talk titled "Common Indicators Hurt Armed Conflict Prediction"

LIPARI SCHOOL ON COMPUTATIONAL COMPLEX AND SOCIAL SYSTEMS 2023
Lipari, Italy

LIPARI SCHOOL ON COMPUTATIONAL COMPLEX AND SOCIAL SYSTEMS 2022
Lipari, Italy

BIGSSS SUMMER SCHOOL IN COMPUTATIONAL SOCIAL SCIENCE 2022
Groningen, Netherlands

- Project topic: "Dynamical reciprocity in office spaces"

THE GREAT RESIGNATION WORKSHOP   **2022**
Vienna, Austria

GLOBAL INITIATIVE OF ACADEMIC NETWORKS (GIAN) WORKSHOP   **2018**
Indore, India

- Topic of workshop: "Network Science- from structure to dynamic"

MEDIA APPEARANCES

Articles
- The Military's Recruitment of AI Has Already Begun
- Forscher beobachten "Lawinen" bei Ausbreitung bewaffneter Konflikte
- Scientists develop method to predict the spread of armed conflicts

Audio/Video
- Gave a live interview at the BBC newsday radio show.
- Our paper was featured in Sabine Hossenfelder's science news.

OTHER ACTIVITIES

Students/interns supervised
- **Shlok Shah** from Princeton University in 2024.
- **Clemens Baldzuhn** from TU Berlin in 2024.)

Positions of Responsibility
- **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)
- **House sports captain** during school (one year)
- **House prefect** during school (two years)

Volunteering Work
- Volunteered at the Buddy Project, Vielmehr für Alle! in Vienna. Taught refugee high school students.
- Started an NGO with college friends at BHU to educate underprivileged kids in Varanasi.

Select Online Courses
- "Network Dynamics of Social Behaviour" by University of Pennsylvania
- "From big bang to dark energy by Prof. Hitoshi Murayama" by University of Tokyo
- "Social Norms, Social change" by UNICEF
- "Digital media marketing" by Internshala

Model United Nations Conferences
- Participated in the "BHU-Model United Nations conference, 2016"
- Participated in the "Ganges model united nations, 2017"
- Participated in the 'Malviya national youth parliament 2017"