Manish Khanal

PhD Candidate, Department of Physics and Astronomy
University of Utah, Salt Lake City, Utah, USA
Contact: +1 385 371 9075 | Email: manish.khanal@utah.edu
Personal Website | LinkedIn | ResearchGate

Physics researcher at the University of Utah, focusing on neutrino astrophysics and renewable energy systems for Antarctic research. My work involves analyzing high-energy neutrino emission from Seyfert galaxies with IceCube data and assessing sustainable energy solutions for the IceCube-Gen2 facility.

EDUCATION

PhD in Physics | Aug 2022 – Present
- University of Utah, Salt Lake City, Utah, USA
- Advisor: Prof. Carsten Rott, Shiqi Yu

Bachelor's degree in physics | Feb 2015 – Oct 2019
- Amrit Campus, Tribhuvan University, Kathmandu, Nepal

RESEARCH EXPERIENCE

Graduate Research Assistant | University of Utah | *May 2023 – Present Focus: High-Energy Neutrino Astrophysics & Sustainable Energy Systems*
Neutrino Astrophysics (IceCube Collaboration)
- Incorporated the "Disk-Corona" model into the analysis to search for neutrino emission from Seyfert Galaxies
- Performed statistical analysis of background and signal trials to calculate the significance of neutrino excess, utilizing high-performance computer clusters

Renewable Energy for Polar Environments
- Led the design of autonomous bifacial solar photovoltaic (PV) system for the extreme environmental conditions for the South Pole.
- Conducting a large-scale feasibility assessment for the IceCube-Gen2 sustainability initiative, which involved validating simulation models using in-situ data to characterize long-term performance
- Created comprehensive technical documentation and standard operating procedures (SOPs) for the system deployment; coordinated with US Antarctic Program (USAP) to manage shipping logistics.

Researcher | Tribhuvan University | *Jan 2020 – Jun 2022 Focus: Space Weather & Geomagnetism*
- Solar Wind Dynamics: Analyzed in-situ solar wind component from Parker Solar Probe (PSP) during perihelion encounters (at 0.17 AU) and OMNI database to characterize and compare solar wind parameters at different distances from the Earth.
- Applied Continuous and Discrete Wavelet Transforms (CWT/DWT) to identify patterns and fluctuations in the magnetic field data.

TECHNICAL SKILLS

- **Programming & Scripting:** Python (Data Analysis, Visualization, Machine Learning), HTML/CSS.
- **Mobile & Web Development:** iOS & macOS App Development (Xcode, SwiftUI), Web Design.
- **Data Science & Visualization:** GNU plot, Origin.
- **Software Tools & Version Control:** Git/GitHub, LaTeX.

PUBLICATIONS

First-Author and Lead Contributions

- **Khanal, M.**, & Rott, A. (2025). *Sustainability and Environmental Impact of IceCube-Gen2*. *Proceedings of Science (PoS), ICRC 2025* https://pos.sissa.it/501/1159/
- Gautam, S. P., Silwal, A., Basyal, A., Chaudhary, K., **Khanal, M.**, Ale, B., Adhikari, B., Poudel, P., Karki, M., & Chapagain, N. P. (2021). *Tracking IMF Fluctuations near Sun using Wavelet Analysis: Parker Solar Probe First Encounter Data*. *Geomagnetism and Aeronomy.*
- Silwal, A., Gautam, S. P., Chaudhary, K., **Khanal, M.,** Joshi, S., Dangaura, S., & Adhikari, B. (2021). Study of solar wind parameters during geomagnetic storm of 26th August 2018 and 28th September 2017. *Thai Journal of Physics*, *38*(2), 54-68.

Collaboration Publications (IceCube Collaboration)

- Abbasi, R., Ackermann, M., Adams, J., Agarwalla, S. K., Aguilar, J. A., Ahlers, M., … **Khanal, M.**, … & Hoffman, K. D. (2024). *Characterization of the astrophysical diffuse neutrino flux using starting track events in IceCube*. *Physical Review D, 110*(2), 022001.
- Abbasi, R., Ackermann, M., Adams, J., Agarwalla, S. K., Aguilar, J. A., Ahlers, M., … **Khanal, M.**, … & Hill, G. C. (2024). *Search for an eV-Scale Sterile Neutrino Using Improved High-Energy νμ Event Reconstruction in IceCube*. *Physical Review Letters, 133*(20), 201804.

Full publication list available on Google Scholar: Google Scholar – Manish Khanal

AWARDS AND FUNDING

Swigart Fellowship | University of Utah | Grant: $6,500 | May – Aug 2023

- Project: "**Feasibility Assessment of Solar Photovoltaics as a Sustainable Energy Source for Power Generation for the IceCube Gen2 Construction**"
- Analyzed South Pole meteorological data and field test results to validate simulation models for bifacial solar panel performance.
- Utilized Python and machine learning techniques to predict energy generation efficiency under extreme polar conditions.

ACADEMIC SERVICE AND LEADERSHIP

Organization Team Member – IceCube Masterclass (2026, 2025, 2024) | April 2024, 2025, 2026

- Helped high school students understand the basics of neutrino astrophysics and cosmic rays.
- Guided students in using analysis tools from the IceCube Neutrino Observatory.

Fall Symposium Evaluator Office of Undergraduate Research, University of Utah | Dec 2025

- Selected as an Evaluator Prize Winner for providing feedback to undergraduate presenters.
- Evaluated research presentations and provided constructive feedback on methodology and communication.

Local Organization committee of IceCube Fall Collaboration Meeting, 2025 | Oct 2025

- Volunteered for the organization of the meeting and tech support
- Presented my work on Sustainability and Environmental Impact of IceCube-Gen2 and Neutrino Emission analysis from Seyfert Galaxies

Graduate Student Advisory Committee (GSAC), *Retention, Promotion, and Tenure (RPT) Evaluation*
Department of Physics and Astronomy, University of Utah| Aug 2025

- Participated in the evaluation of an Assistant Professor's RPT case, providing graduate student perspective on teaching, mentorship, and academic contributions.

President, Nepalese Student Association, University of Utah | 2023–2024

- Organized cultural and community events, managed organizational budget, and coordinated with the ASUU to support student engagement and event planning.

CONFERENCES & SCHOOLS

Americal Physical Society (APS) Global Physics Summit, Denver, CO | Mar 2026

- **Presentation:** *A Search for Neutrino Emission from Seyfert Galaxies in the Southern Sky Using IceCube Dataset*.

Particle Cosmology in the Southwest (PCS) 2025 Workshop, Albuquerque, NM | Sep 2025

- **Presentation:** *A Search for Neutrino Emission from Seyfert Galaxies in the Southern Sky Using IceCube Dataset*.

IceCube Summer School organized by **University of Wisconsin Madison |** June 2023

Poster Presentation on **American Physical Society (APS) 4 Corners** meeting | Oct 2023

- **Poster Title**: *Feasibility Assessment of Solar Photovoltaics as a Sustainable Energy Source for Power Generation for the IceCube Gen2 Construction*

TEACHING EXPERIENCE

Teaching Assistant | **PHYS 2020** | Instructor: Dr. Kelby Hahn | Aug 2022 – May 2023

- Leading the discussion section, grading homework and exams

Pragya Secondary School**,** Kathmandu, Nepal | Jan 2020 – Jun 2022

- Teacher (Mathematics and Science) for Secondary School Level

MEDIA COVERAGE AND PUBLIC ENGAGEMENT

- *"Voices of IceCube"* IceCube Collaboration (April 2026)
  Featured in the official IceCube public outreach series

- Office of the Vice President for Research, University of Utah, "*U Astrophysics: A National Research Standout*" 2026
  Featured in institutional research impact coverage highlighting astrophysics research activities, including presentation and demonstration of solar photovoltaic system development for research application

- University of Utah News, "Upgrade for IceCube Neutrino Observatory" 2026
  Featured in institutional coverage of IceCube Neutrino Observatory Upgrade, which also highlights development and testing of solar photovoltaic systems for polar research infrastructure.

- IceCube Collaboration News, *"IceCube meets in Salt Lake City for its fall 2025 collaboration meeting"*
  Coverage of the IceCube Collaboration meeting hosted at the University of Utah, including a tour of the Utah IceCube group's facilities and research activities.