

Mehr Un Nisa

Department of Physics and Astronomy
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U.S.A.

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Date of Birth: 03/21/1989
Gender: Female

Fields of Research Interest

Neutrino Astronomy, Gamma-ray Astrophysics, Dark Matter, Cosmic rays.

Employment

Assistant Professor
Michigan State University, East Lansing, MI.

August 2023 – Present

Postdoctoral Research Associate
Michigan State University, East Lansing, MI.

2019 – August 2023

Education

Ph.D, Physics
University of Rochester, Rochester, NY.
Dissertation: "Constraining TeV-scale Astrophysical Foregrounds for Dark Matter Searches with HAWC."
Advisor: Segev BenZvi

2013 – 2018

Bachelor of Science, Physics
LUMS School of Science and Engineering, Lahore, Pakistan.

2008 – 2012

Research Leadership

Working Group Lead: BSM Physics Working Group
IceCube Collaboration

2023 – Present

Technical Lead: Neutrino Sources Working Group
IceCube Collaboration

2022 – 2023

Convener: Particle Physics Working Group
HAWC Collaboration

2019 – 2023

Research Experience

Member IceCube Collaboration

2019 – Present

Recent Projects

- Search for Transient Neutrino Emission from X-ray binaries and TeV blazars
- Search for Neutrinos from Galaxy Clusters
- Search for Extended Neutrino Emission in the Galactic Plane
- Signatures of Dark Matter Annihilation in Dwarf Spheroidal Galaxies
- First Catalog of Neutrino Alerts from the IceCube Realtime Data Stream

Member HAWC Collaboration

2015 – Present

Recent Projects

- Discovery of TeV Gamma-ray Emission from the Sun
- Signatures of Decaying Dark Matter in the Virgo Cluster
- 3HWC Survey: The Third Catalog of Very-High-Energy Gamma-ray Sources

Member P-ONE Collaboration

2023 – Present

Recent Projects

- Sensitivity of P-ONE to Steady Sources of Neutrinos

Seminars, Colloquia and Selected Conference Talks

04/25/2024 Center for Relativistic Astrophysics Seminar, Georgia Tech (Invited Talk) "Unveiling the TeV Sky in Neutrinos and Gamma rays"

10/22/2023 IceCube Collaboration Meeting (Invited Talk) "Particle Astrophysics with the Very-High-Energy Sun"

03/26/2023 AAS HEAD Meeting 2023 (Invited Talk) "Neutrino Astronomy: Overview and Prospects"

02/06/2023 Cosmic Physics Center Seminar, Fermi National Accelerator Laboratory (Invited Talk)

- 11/29/2022 **MAGIC Multi-wavelength and Multi-messenger Seminar (Invited Talk)** "Ice-Cube in the Era of Realtime Multi-messenger Astronomy"
- 08/08/2022 **TeVPA 2022** "HAWC Observations of Gamma Rays from the Quiescent Sun"
- 06/09/2022 **NASA Goddard Space Flight Center Colloquium (Invited Talk)** "The Search for Dark Matter in the Very-high-energy Sky"
- 04/04/2022 **Physics Seminar – NUST (Invited Talk)** "The Search for Dark Matter in the Ultra-high-energy Sky"
- 03/28/2022 **University of Michigan Ann Arbor (Invited Talk)** "Mapping the TeV Sky with HAWC"
- 02/24/2022 **University of Massachusetts Lowell Center for Space Science & Technology (Invited Talk)** "Mapping the TeV Sky with HAWC"
- 02/16/2022 **University of Maryland (Invited Talk)** "The TeV Sky in Neutrinos and Gamma rays"
- 10/29/2021 **TeVPA 2021** "A Time-independent Search for Neutrinos from Galaxy Clusters with IceCube"
- 09/13/2021 **HQL 2021 (Invited Talk)** "Probing the Neutrino Sky for New Physics with Ice-Cube"
- 06/07/2021 **AAS 2021 (Invited Talk)** "The Sun as a Target for Very-High-Energy Gamma-Ray Observations"
- 03/29/2021 **Winter Aspen Conference** "A Glimpse into the Dark Sector with TeV Gamma Rays and Cosmic Rays"
- 02/02/2021 **COSPAR 2021 (Invited Talk)** "Mapping the TeV Sky with HAWC in the era of CTA"
- 10/1/2019 **HEP Seminar – MSU (Invited Talk)** "Constraining the Foregrounds for New Physics Searches in TeV Cosmic rays and Gamma rays"
- 06/20/2019 **Physics Research Seminar – LUMS (Invited Talk)** "Observing the Very-High-Energy Sky for Particle Signatures of Dark Matter"
- 09/18/2018 **CCAPP Seminar – Ohio State University (Invited Talk)** "Looking for New Physics with HAWC Observations of the Moon and the Sun"

Teaching

PHY 221: Studio Physics for Life Scientists 1 *Spring 2024*

Outreach and EDI Efforts

2024 MSU Science Festival Presenter and Organizer

2022-Present Supernova Foundation Mentor

2021-2023 IceCube Diversity Task Force Member

2022 Pakistan Alliance for Math and Science STEM Ambassador (Aimed at High School Girls)

2020,2024 Astronomy on Tap, Lansing - MI Public Talk on High Energy Astrophysics

2019 National Incubation Center, Lahore, Pakistan Public Talk on Dark Matter

2017-2019 IceCube MasterClass for High School Students Tutor

2018 IAU Astronomy Translation Network Translator/Scientific Reviewer

2018 University of Rochester Pre-College Summer Program Tutor

2016-2017 University of Rochester Upward Bound Program Physics Demo Instructor

2017 APS April Meeting Press Conference

Peer Review

Fermi Gamma-Ray Space Telescope Cycle-15 Guest Investigator Program 2022
Peer Review Panelist

Physical Review Letters 2023
Referee

Physical Review D 2023
Referee

Astrophysical Journal
Referee

2023

Research Supervision and Mentorship

Postdoctoral Researchers

Rishi Babu (2024–Present)

Graduate Students

Alejandra Granados (2024–Present)

Dan Salazar (2020–Present)

Devyn Rysewyk (2019–2021), now at Johns Hopkins University Applied Physics Laboratory

Alison Peisker (2019–2021), now at Fermi Lab

Undergraduate Students

Caroline Seidenzahl (2022)

Dhiti Doddamreddy (2023–Present)

Purvi Garg (2023–Present)

Brandon Pries (2021–Present), now a graduate student at Georgia Tech University

Publications

- Google Scholar
- ADSABS
- INSPIRE

As Primary Author

- [1] A. Albert *et al.*, “Search for decaying dark matter in the Virgo cluster of galaxies with HAWC,” *Phys. Rev. D*, vol. 109, no. 4, p. 043034, 2024.
- [2] A. Albert *et al.*, “Discovery of Gamma Rays from the Quiescent Sun with HAWC,” *Phys. Rev. Lett.*, vol. 131, no. 5, p. 051201, 2023.
- [3] R. Abbasi *et al.*, “Search for Extended Sources of Neutrino Emission in the Galactic Plane with IceCube,” *Astrophys. J.*, vol. 956, no. 1, p. 20, 2023.
- [4] R. Abbasi *et al.*, “IceCat-1: the IceCube Event Catalog of Alert Tracks,” *Astrophys. J. Suppl.*, vol. 269, no. 1, p. 25, 2023.
- [5] R. Abbasi *et al.*, “Searching for High-Energy Neutrino Emission from Galaxy Clusters with IceCube,” *Astrophys. J. Lett.*, vol. 938, p. L11, 6 2022.
- [6] R. Abbasi *et al.*, “Search for GeV-scale Dark Matter Annihilation in the Sun with IceCube DeepCore,” *Phys. Rev. D*, vol. 105, no. 6, p. 062004, 2022.
- [7] A. Albert *et al.*, “3hwc: The third HAWC catalog of very-high-energy gamma-ray sources,” *The Astrophysical Journal*, vol. 905, p. 76, dec 2020.
- [8] M. U. Nisa, J. F. Beacom, S. Y. BenZvi, R. K. Leane, T. Linden, K. C. Y. Ng, A. H. G. Peter, and B. Zhou, “The Sun at GeV–TeV Energies: A New Laboratory for Astroparticle Physics,” *Bulletin of the American Astronomical Society*, vol. 51, no. 194, 2019.
- [9] A. Albert *et al.*, “First HAWC Observations of the Sun Constrain Steady TeV Gamma-Ray Emission,” *Phys. Rev.*, vol. D98, no. 12, p. 123011, 2018.
- [10] A. Albert *et al.*, “Constraints on Spin-Dependent Dark Matter Scattering with Long-Lived Mediators from TeV Observations of the Sun with HAWC,” *Phys. Rev. D*, 2018. [Phys. Rev.D98,123012(2018)].
- [11] A. U. Abeysekara *et al.*, “Constraining the \bar{p}/p ratio in TeV cosmic rays with observations of the Moon shadow by HAWC,” *Phys. Rev.*, vol. D97, no. 10, p. 102005, 2018.

As a Contributing Author

- [1] A. Albert *et al.*, “Constraining the Local Burst Rate Density of Primordial Black Holes with HAWC,” *JCAP*, vol. 04, p. 026, 2020.
- [2] R. Lopez-Coto, J. Hahn, S. BenZvi, B. Dingus, J. Hinton, M. U. Nisa, R. D. Parsons, F. Salesa Greus, H. Zhang, and H. Zhou, “Effect of the diffusion parameters on the observed γ -ray spectrum of sources and their contribution to the local all-electron spectrum: The EDGE code,” *Astropart. Phys.*, vol. 102, pp. 1–11, 2018.

References

- Claudio Kopper**
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Associate Professor of Physics, Michigan State University
- Tyce Deyoung**
tyce.deyoung@icecube.wisc.edu
Professor of Physics, Michigan State University
- Annika Peter**
peter.33@osu.edu
Professor of Physics & Astronomy, Ohio State University
- Kirsten Tollefson**
tollefs2@msu.edu
Professor of Physics, Michigan State University
- John Beacom**
beacom.7@osu.edu
Professor of Physics & Astronomy, Ohio State University

Academic Honors, Fellowships and Grants

NASA Heliophysics Supporting Research Program (2020–2023) Collaborator on project with PI Professor Annika Peter (OSU)

American Physical Society Travel Grant 2018 Travel funding awarded by the division of particles and fields to attend the APS April Meeting in Columbus, Ohio.

American Physical Society Travel Grant 2017 Travel funding awarded by the division of astrophysics to attend the APS April Meeting in Washington D.C.

Fulbright Scholarship for Masters in 2013
Declined in favor of attending Ph.D. program at University of Rochester.

National Physics Talent Contest 2007
Selected as one of the top 50 students who underwent training for the International Physics Olympiad 2008.