

CURRICULUM VITAE

Vivek Sharma

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Basic Information

Dr. Vivek Sharma
(Assistant Professor)
Department of Physics,
H.N.B. Garhwal University,
Srinagar-Garhwal,
Uttarakhand-246174, India.

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Areas of Scientific Interest

Experimental High-Energy Physics: Standard Model Neutrino Physics and Dark Matter Searches; Non-Standard Interactions; Detector R&D, Simulation and Data Acquisition Systems.

Academic and Professional Details

2.1 Positions Held

- **Assistant Professor**
Department of Physics,
H.N.B. Garhwal University, Srinagar-Garhwal, India. June 2022 - Present
- **Assistant Professor (Research)**
Center of Cosmology, Astrophysics, and Space Science,
GLA University, Mathura, India. Mar. 2022 - June 2022
- **Post-Doctoral Fellow (TEXONO Group)**
Institute of Physics, Academia Sinica, Taipei, Taiwan. Dec. 2018 - Dec. 2021
- **Visiting Research Expert (TEXONO Group)**
Institute of Physics, Academia Sinica, Taipei, Taiwan. Mar. 2017 - Dec. 2018

2.2 Education

Ph.D. in Applied Physics

Banaras Hindu University, Varanasi, India 2011-2017

- Thesis: **Experimental studies on Coherent Elastic Neutrino Nucleus Scattering and Dark Matter Searches with Germanium Detectors**
- Advisors: Dr. V. S. Subrahmanyam¹, Prof. Venktesh Singh¹ and Henry Tsz-King Wong².
- ¹Department of Physics, Banaras Hindu University, Varanasi, India.
- ²Institute of Physics, Academia Sinica, Taipei, Taiwan.

Master of Science (First Div.)

M. J. P. Rohilkhand University, Bareilly, India. 2007-2009

- Applied Physics
- Specialization: Condence Matter Physics, Material Science.

Bachelor of Science (First Div.)
M. J. P. Rohilkhand University, Bareilly, India. 2004-2007
- Physics, Mathematics and Chemistry

Sr. Sec. High School
U. P. M. S. P. Board, Allahabad, India. 2002-2004

High School
U. P. M. S. P. Board, Allahabad, India. 2001-2002

2.3 Awards and Merits

- Taiwan Physical Society Oral Presentation Award (TPS Meeting). 2020
- Ministry of Science and Technology (Taiwan) Fellowship. 2019
- Institute of Physics, Academia Sinica Fellowship. 2018

2.4 Technical Skills

- Hands on experience with semiconductor, scintillator, gaseous detectors, turbo pumps and associated hardware, related.
- Experience in handling data taking and storage related electronic instruments and modules.
- Hands on experience in developing National Instruments (NI) based data acquisition (DAQ) system.
- Hands on experience in analysis software such as ROOT.
- Programming C, C++ scripting, Mathematica and Labview.
- Hands on experience on Geant4 simulation.
- Hands on experience in build and monitor the Raid array for large data storage and NAS (Network Attached Storage) server.

2.5 Current Research Activities

My current research work is to probe the **coherence effects in Elastic Neutrino Nucleus Scattering** and to explore the **experimental scenarios for νA_{el} and dark matter searches** with sub-keV sensitivity detectors. In our recent work, we have defined a parameter α to measure the degree of coherency in νA_{el} . Reactor neutrinos are the most prominent candidate to probe νA_{el} with high coherence effects. The divergence from full coherence leads to the study of neutron density distribution and to constrain the sensitivities in probing physics beyond the Standard Model.

Conference/School Attended

- *65th DAE-BRNS Symposium on Nuclear Physics, (Online), India (2021).*
- *The Magnificent CE ν NS Workshop, (Online), U.S.A. (2021)*

- *17th International Conference on Topics in Astroparticle and Underground Physics, (Online), Spain (2021).*
- *28th International Workshop on Weak Interactions and Neutrinos, (Online), U.S.A. (2021).*
- *24th DAE-BRNS Symposium on High Energy Physics, (Online), India (2020).*
- *The Magnificent CE ν NS Workshop, (Online) (2020).*
- *40th International Conference on High Energy Physics, (Online), Prague (2020).*
- *Annual Meeting of the Physical Society of the Republic of China, Pingtung, Taiwan (2020).*
- *16th International Conference on Topics in Astroparticle and Underground Physics, Toyama, Japan, (2019).*
- *Annual Meeting of the Physical Society of the Republic of China, Hsinchu, Taiwan (2019).*
- *5th International Workshop on Dark Matter, Dark Energy and Matter-AntiMatter Asymmetry, NTHU, Hsinchu and Fo-Guang Shan, Kaoh-Siung, Taiwan (2019).*
- *PIRE-GEMADARC Summer School, Sichuan University, Chengdu, China (2018).*
- *The 2nd PIRE-GEMADARC collaboration meeting, Xichang, China (2018).*
- *62nd DAE-BRNS Symposium on Nuclear Physics, Thapar University, Patiala, India (2017).*
- *International Workshop on Applied Antineutrino Physics, BARC, Mumbai, India (2017).*
- *NCTS Workshop on Dark Matter, Particles and Cosmos, NDHU, Hualien, Taiwan (2017).*
- *13th Rencontres Du Vietnam, Exploring the Dark Universe, Quy Nhon, Vietnam (2017).*
- *13th Rencontres Du Vietnam, Neutrinos, Quy Nhon, Vietnam (2017).*
- *10th One day Conference at Department of physics Banaras Hindu University Varanasi, India (2017).*
- *4th International Workshop on Dark Matter, Dark Energy and Matter-AntiMatter Asymmetry, NTHU, Hsinchu, Taiwan (2016).*
- *Asia Europe Pacific School for High Energy Physics, Beijing, China (2016).*
- *Summer Institute on Phenomenology of Elementary Particle Physics and Cosmology, Xi Tou, Taiwan (2016).*
- *1st KEK-KIAS-NCTS Joint Workshop on Particle Physics Phenomenology, NTHU, Hsinchu, Taiwan (2016).*
- *NCTS school on Atomic Theory for Low Energy Detector Responces, NDHU, Hualien, Taiwan (2016).*
- *Annual Meeting of the Physical Society of the Republic of China, Kaohsiung, Taiwan (2016).*
- *International Conference on Massive Neutrinos, Nanyang Technological University, Singapore (2015).*
- *The second Institute of Advance Studies School on Particle Physics, Cosmology and Implications for technology, Nanyang Technological University, Singapore (2015).*

- *INO (Indiabased Neutrino Observatory) Collaboration meeting, BARC, Mumbai, India (2013).*
- *Winter School on High Energy Physics, Banaras Hindu University, Varanasi, India (2013).*
- *INO Collaboration meeting, BARC, Mumbai, India (2012).*
- *57th DAE-BRNS Symposium on Nuclear Physics, University of Delhi, India (2012).*
- *International Conference on Recent Trends in Nuclear Physics (ICRTNP), Chitkara University, Barotiwala, India (2012).*
- *6th One day Conference at Department of physics Banaras Hindu University Varanasi, India (2012).*
- *5th One day Conference at Department of physics Banaras Hindu University Varanasi, India (2011).*

Oral Presentations/Invited Talks

1. **“Probing the Neutrino-Nucleus Elastic Scattering with Point Contact Germanium detectors and its Quantum-Mechanical Coherency Effects”**,
“65th DAE-BRNS Symposium on Nuclear Physics, India, 2021”
2. **“Probing the Neutrino-Nucleus Elastic Scattering with Point Contact Germanium detectors and its Quantum-Mechanical Coherency Effects”**,
“The Magnificent CE ν NS, U.S.A., 2020”
3. **“Probing the Neutrino-Nucleus Elastic Scattering with Point Contact Germanium detectors and its Quantum-Mechanical Coherency Effects”**,
“17th International Conference on Topics in Astroparticle and Underground Physics, Spain, (2021)”
4. **“Studies of Quantum Mechanical Coherency Effects in Neutrino-Nucleus Elastic Scattering”**,
“40th International Conference on High Energy Physics (ICHEP2020), Spain, 2020”
5. **“Studies of Neutrino Nucleus Elastic Scattering at Reactors”**,
“The Annual Meeting of the Physical Society of Taiwan, Pingtung, Taiwan, 2020”
6. **“Coherency in Neutrino-Nucleus Elastic Scattering”**,
“16th International Conference on Topics in Astroparticle and Underground Physics, Toyama, Japan, 2019”
7. **“Status of Neutrino-Nucleus Scattering experiment at Kuo-Sheng Reactor Neutrino Laboratory”**,
“Annual Meeting of the Physical Society of the Republic of China, Hsinchu, Taiwan, 2019”
8. **“Coherency in Neutrino-Nucleus (νA_{el}) Scattering”**,
“5th International Workshop on Dark Matter, Dark Energy and Matter-AntiMatter Asymmetry, NTHU, Hsinchu and Fo-Guang Shan, Kaoh-Siung, Taiwan, 2019”
9. **“Initial testing and characterization from Electric cooling Ge detectors”**,
“The 2nd PIRE-GEMADARC collaboration meeting, Xichang, China, 2018”

10. **“Coherent Elastic Neutrino-Nucleus Scattering”**,
“DAE Symposium on Nuclear Physics, Patiyala, 2017”
11. **“Status of Neutrino-Nucleus Coherent Elastic Scattering measurement from TEXONO”**,
“International Workshop on Applied Antineutrino Physics, Mumbai, 2017”
12. **“Coherent scattering of neutrinos with nucleus”**,
“13th Rencontres Du Vietnam, Neutrinos, Quy Nhon, Vietnam, 2017”
13. **“Neutrino-Nucleus Coherent Elastic Scattering (νA_{el}) at TEXONO”**,
“NCTS Workshop on Dark Matter, Particles and Cosmos, NDHU, Taiwan, 2017”
14. **“Towards Observation of Neutrino-Nucleus Coherent Scattering with Point-Contact Germanium Detector at Kuo-Sheng Reactor Neutrino Laboratory”**,
“4th International Workshop on Dark Matter, Dark Energy and Matter-AntiMatter Asymmetry, NTHU, Hsinchu, Taiwan, 2016”
15. **“Coherency in Neutrino-Nucleus Elastic Scattering”**,
“1st KEK-KIAS-NCTS Joint Workshop on Particle Physics Phenomenology, NTHU, Hsinchu, Taiwan, 2016”
16. **“Towards Observation of Neutrino-Nucleus Coherent Scattering with Point-Contact Germanium Detector at Kuo-Sheng Reactor Neutrino Laboratory”**,
“Annual Meeting of the Physical Society of the Republic of China, Kaohsiung, Taiwan, 2016”

Poster Presentations

1. **“Low Threshold Germanium Detectors for Neutrino-Nucleus Elastic Scattering and the Studies of its Quantum-Mechanical Coherency Effects”**,
“17th International Conference on Topics in Astroparticle and Underground Physics, Spain, 2021.”
2. **“Low Threshold Detectors for Neutrino-Nucleus Elastic Scattering and the Studies of its Quantum-Mechanical Coherency Effects”**,
“28th International Workshop on Weak Interactions and Neutrinos, USA, 2021.”
3. **“Quantum Mechanical Coherency Effects in Neutrino-Nucleus Elastic Scattering”**,
“24th DAE-BRNS Symposium on High Energy Physics, NISER-Odisha, 2020”
4. **“Studies of Quantum Mechanical Coherency Effects in Neutrino-Nucleus Elastic Scattering”**,
“Neutrino, 2020”

List of Publications

1. Constraints on sub-GeV Dark Matter Boosted by Cosmic Rays from CDEX-10 Experiment at the China Jinping Underground Laboratory,

- R. Xu et al.,
[arXiv 2201.01704v1](#), (2022).
2. **Studies of the Earth shielding effect to direct dark matter searches at the China Jinping Underground Laboratory**,
Z.Z. Liu et al.,
[Phys. Rev. D 105](#), 052005 (2022).
 3. **Studies of Quantum-Mechanical Coherency Effects in Neutrino-Nucleus Elastic Scattering**,
V. Sharma et al.,
[Phys. Rev. D 103](#), 092002 (2021).
 4. **First experimental constraints on WIMP couplings in the effective field theory framework from CDEX**,
Y. Wang, et al.,
[Science China \(Phys., Mech. & Astro.\) 64](#), 8 281001 (2021).
 5. **Direct Detection Constraints on Dark Photons with the CDEX-10 Experiment at the China Jinping Underground Laboratory**,
Z. She, et al.,
[Phys. Rev. Lett. 124](#), 111301 (2020).
 6. **Improved limits on solar axions and bosonic dark matter from the CDEX-1B experiment using the profile likelihood ratio method**,
Y. Wang, et al.,
[Phys. Rev. D 101](#), 052003 (2020).
 7. **Exposure-background duality in the searches of neutrinoless double beta decay**,
M. K. Singh, et al.,
[Phys. Rev. D 101](#), 013006 (2020).
 8. **Required sensitivity in the search of neutrinoless double beta decay in ^{124}Sn** ,
M. K. Singh, et al.,
[Indian J. of Phys. 18](#), (2019).
 9. **Search of Light-Weakly-Interacting-Massive-Particle Dark Matter by annual modulation analysis with a point-contact germanium detector at the China Jinping Underground Laboratory**,
L. T. Yang, et al.,
[Phys. Rev. Lett. 123](#), 221301 (2019).
 10. **Constraints on Spin-Independent Nucleus Scattering with sub-GeV Weakly Interacting Massive Particle Dark Matter from the CDEX-1B Experiment at the China Jinping Underground Laboratory**,
Z.Z. Liu, et al.,
[Phys. Rev. Lett. 123](#), 161301 (2019).
 11. **Constraints on Bosonic Dark Matter with Low Threshold Germanium Detector at Kuo-Sheng Reactor Neutrino Laboratory**,
M. K. Singh, V. Sharma* et al.,
[Chinese J. of Phys. 58](#), 63 (2019).

12. **Constraints on millicharged particles with low-threshold germanium detectors at Kuo-Sheng Reactor Neutrino Laboratory,**
L. Singh, et al.,
[Phys. Rev. D **99**, 032009 \(2019\).](#)
13. **Performances of a prototype point-contact germanium detector immersed in liquid nitrogen for light dark matter search,**
H. Jiang, et al.,
[Science China \(Phys., Mech. & Astro.\) **62**, 031012-1 \(2018\).](#)
14. **Neutron background measurements with a hybrid neutron detector at the Kuo-Sheng Reactor Neutrino Laboratory,**
A. Sonay, et al.,
[Phys. Rev. C **98**, 024602 \(2018\).](#)
15. **Status of the search of coherent neutrino nucleus elastic scattering at KSNL,**
V. Sharma et al.,
[Indian J. of Phys. **92**, 1145 \(2018\).](#)
16. **Limits on light WIMPs with a 1 kg-scale germanium detector at 160 eVee physics threshold at the China Jinping Underground Laboratory,**
Li-Tao Yang, et al.,
[Chinese Phys. C **42**, 023002 \(2018\).](#)
17. **Limits on Light Weakly Interacting Massive Particles from the First 102.8 kg×day Data of the CDEX-10 Experiment,**
H. Jiang et al.,
[Phys. Rev. Lett. **120**, 241301 \(2018\).](#)
18. **Characterization of the sub-keV Germanium detector,**
M. K. Singh, et al.,
[Indian J. of Phys. **92**, 401-408, \(2018\).](#)
19. **Bulk and surface event identification in p-type germanium detectors,**
L. T. Yang, et al.,
[Nucl. Inst. and Meth. in Phys. Res. A **886**, 13-23 \(2018\).](#)
20. **Background rejection of TEXONO experiment to explore the sub-keV energy region with HPGe detector,**
M. K. Singh, et al.,
[Indian J. of Phys. **91**, 12771291 \(2017\).](#)
21. **Constraints on axion couplings from the CDEX-1 experiment at the China Jinping Underground Laboratory,**
S. K. Liu, et al.,
[Phys. Rev. D **95**, 052006 \(2017\).](#)
22. **The first result on ^{76}Ge neutrinoless double beta decay from CDEX-1 experiment,**
Wang. Li, et al.,
[Science China \(Phys., Mech. & Astro.\) **60**, 7 \(2017\).](#)

23. **Design and Performance of a Hybrid Fast and Thermal Neutron Detector**,
M. K. Singh, et al.,
[Nucl. Inst. and Meth. in Phys. Res. A **868** , 109-118 \(2017\).](#)
24. **Search of low-mass WIMPs with a p-type point contact germanium detector in the CDEX-1 experiment**,
W. Zhao, et al.,
[Phys. Rev. D **93**, 092003 \(2016\).](#)
25. **Characterization and performance of germanium detectors with sub- keV sensitivities for neutrino and dark matter experiments**,
A. K. Soma, et al.,
[Nucl. Inst. and Meth. in Phys. Res. A **836**, 67-82 \(2016\).](#)
26. **Coherency in neutrino-nucleus elastic scattering**,
S. Kerman, **V. Sharma**, et al.,
[Phys. Rev. D **93**, 113006 \(2016\).](#)
27. **Differentiation of bulk and surface events in p-type point-contact germanium detectors for light WIMP searches**,
H. B. Li, et al.,
[Astroparticle Physics **56**, 1-8 \(2014\).](#)

List of Papers Published in Conference and Proceedings

1. 17th International Conference on Topics in Astroparticle and Underground Physics, Spain, (2021),
“**Probing the Neutrino-Nucleus Elastic Scattering with Point Contact Germanium detectors and its Quantum-Mechanical Coherency Effects**”,
V. Sharma et al.,
[J. Phys.: Conf. Ser. **2156**, 012206 \(2021\).](#)
2. 40th International Conference on High Energy physics (ICHEP2020),
“**Studies of Quantum Mechanical Coherency Effects in Neutrino-Nucleus Elastic Scattering**”,
V. Sharma et al.,
[Proceedings of Science **390**, \(2021\).](#)
3. 16th International Conference on Topics in Astroparticle and Underground Physics, Toyama, Japan, (2019),
“**Coherency in Neutrino-Nucleus Elastic Scattering**”,
V. Sharma et al.,
[J. Phys.: Conf. Ser. **1468**, 012149 \(2020\).](#)
4. ^{62th}DAE Symposium on Nuclear Physics 2017,
“**Coherent Elastic Neutrino-Nucleus Scattering**”,

- V. Sharma et al.,
DAE Symp. Nucl. Phys. **62**, 19 (2017).
5. ^{61th}DAE Symposium on Nuclear Physics 2016,
“**Study of neutrino properties at TEXONO**”,
M. K. Singh, V. Sharma et al.,
DAE Symp. Nucl. Phys. **61**, 914 (2016).
 6. ^{61th}DAE Symposium on Nuclear Physics 2016,
“**Coherency in Low Energy Neutrino Nucleus Elastic Scatterings**”,
V. Sharma et al.,
DAE Symp. Nucl. Phys. **61**, 888 (2016).
 7. ^{60th}DAE Symposium on Nuclear Physics 2015,
“**Need of Internal Amplification and Germanium Detector for Investigation of Rare Physics Processes**”,
V. Singh, V. Sharma et al.,
DAE Symp. Nucl. Phys. **60**, 1004 (2015).
 8. ^{60th}DAE Symposium on Nuclear Physics 2015,
“**Energy Calibration and Measurement using Signal Amplitude for various Germanium detectors**”,
V. Singh, V. Sharma et al.,
DAE Symp. Nucl. Phys. **60**, 846 (2015).
 9. ^{58th}DAE Symposium on Nuclear Physics 2013,
“**Impedance Measurement of Suitable Materials for INO RPC detector Pickup Strip Panels**”,
M. K. Jaiswal, V. Sharma et al.,
DAE Symp. Nucl. Phys. **58**, 814 (2013).
 10. ^{58th}DAE Symposium on Nuclear Physics 2013,
“**Study of cosmic ray muons momentum and charge asymmetry spectra**”,
V. Sharma et al.,
DAE Symp. Nucl. Phys. **58**, 814 (2013).
 11. ^{57th}DAE Symposium on Nuclear Physics 2012,
“**Study of Surface Resistivity of Resistive Plate Chamber Detectors**”,
M. K. Jaiswal, V. Sharma et al.,
DAE Symp. Nucl. Phys. **57**, 640 (2012).
 12. ^{57th}DAE Symposium on Nuclear Physics 2012,
“**China Jin-Ping Deep Underground Laboratory: Status and Plan**”,
A. K. Soma, V. Sharma et al.,
DAE Symp. Nucl. Phys. **57**, 640 (2012).