Vanamali Shastry

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Postdoctoral appointee
Center for Exploration of Energy & Matter
Indiana University Bloomington, USA

Research Interests

- Hadron spectroscopy including conventional and exotic states, lineshapes of hadrons.
- Mechanisms for photo- and hadroproduction of mesonic and baryonic resonances.
- Structure of mesons and brayons.

Academic Qualifications

Degree	Period	University	Result
Ph.D	2014 - 19	Mangalore University	Awarded
M.Sc Physics (Sp: Nuclear Physics)	2009 - 11	Mangalore University	First class with Distinction (1^{st} rank)
B.Sc	2006 - 09	Mangalore University	First class with Distinction (10^{th} rank)

Title of Ph.D thesis: Nucleon - Nucleon Interaction with Instanton Induced Interaction.
Supervisor: Prof. K. B. Vijaya Kumar.

Awards and Honors

1. KVPY fellow 2008 - 11.
2. UGC - CSIR NET (JRF) Dec. 2010.
3. Young Scientist Award (Runner-up-II) by Dr. KV Rao Scientific Society, Hyderabad, India (2017).

List of Publications

In Journals:

1. K. Quirion *et al.* [JPAC], Nonperturbative aspects of the electromagnetic pion form factor at high energies, Phys.Rev., D111, 054034, 2025 arxiv:2405.09517.
2. Ł. Bibrzycki *et al.* [JPAC], Studying $\pi^+\pi^-$ photoproduction beyond Pomeron exchange, Phys.Rev., D111, 013002, 2025, arxiv:2406.08016.
3. Gloria Montaña, *et al.* [JPAC], Revisiting gauge invariance and Reggeization of pion exchange, Phys.Rev., D110, 114012, 2024, arxiv:2407.19577.
4. Yuchuan Feng, Fernando Gil, Michael Döring, Raquel Molina, Maxim Mai, **Vanamali Shastry**, and Adam Szczepaniak, A unitary coupled-channel three-body amplitude with pions and kaons, Phys.Rev., D110, 094002, 2024, arxiv:2407.08721.
5. D. Winney, *et al.* [JPAC], XYZ spectroscopy at electron-hadron facilities. III. Semi-inclusive processes with vector exchange, Phys.Rev., D109, 114035, 2024, arxiv:2404.05326.
6. **Vanamali Shastry**, Wojciech Broniowski, and Enrique Ruiz Arriola, Off-shellness in generalizzed parton distributions and form factors of the pion, Phys.Rev.D 108, 114024, 2023, arxiv:2308.09236.
7. Wyatt A. Smith, *et al.* [JPAC], Ambiguities in partial wave analysis of two spinless meson photoproduction, Phys.Rev.D 108, 076001, 2023, arxiv:2306.17779.

8. Daniel Winney, *et al.* [JPAC], Dynamics in near-threshold J/ψ photoproduction, Phys.Rev.D 108, 054018, 2023, arxiv: 2305.01449.

9. **Vanamali Shastry** and Francesco Giacosa, Higgs-Higgs scattering and the (non-)existence of the Higgsonium, Eur.Phys.J.C 83, 713, 2023, arxiv:2212.01272.

10. **Vanamali Shastry** and Francesco Giacosa, Radiative production and decays of the exotic $\eta_1'(1855)$ and its siblings, Nucl. Phys. A1037, 2023, 122683 arXiv:2302.07687.

11. Wojciech Broniowski, **Vanamali Shastry**, and Enrique Ruiz Arriola, Off-shell generalized parton distributions and form factors of the pion. Phys. Lett., B840, 137872, 2023, arxiv:2211.11067.

12. **Vanamali Shastry**, Wojciech Broniowski, and Enrique Ruiz Arriola, Generalized quasi, Ioffe-time, and pseudo quark distributions of the pion in the Nambu–Jona-Lasinio model. Phys. Rev., D106 (11):114035, 2022, arxiv:2209.02619.

13. **Vanamali Shastry**, Christian S. Fischer and Francesco Giacosa, The phenomenology of the exotic hybrid nonet with $\pi_1(1600)$ and $\eta_1(1855)$. Phys. Lett., B834, 137478, 2022, arXiv:2203.04327.

14. **Vanamali Shastry**, Enrico Trotti, and Francesco Giacosa. Constraints imposed by the partial wave amplitudes on the decays of $J = 1, 2$ mesons. Phys. Rev., D105 (5):054022, 2022, arxiv:hep-ph/2107.13501.

15. Francesco Giacosa, Anna Okopinska, and **Vanamali Shastry**. A simple alternative to the Breit-Wigner Distribution. Eur. Phys. J. A, 57, 336 (2021), arxiv:hep-ph/2106.03749.

16. Pulak Talukdar, **Vanamali C. Shastry**, Udit Raha, and Fred Myhrer. Radiative Corrections to elastic lepton-proton scattering at the next-to-leading order in chiral perturbation theory. Phys. Rev., D104 (5):053001, 2021, arxiv:nucl-th/2010.09380.

17. Raghavendra S., **Vanamali C. Shastry**, Nilakanthan V. K., and Vijaya Kumar K. B. The effect of Confined One Gluon Exchange Potential and Instanton Induced Interaction in Nucleon-Nucleon Interaction. Commun. Theor. Phys., 72: 065301, 2020, arxiv:1907.11430.

18. Pulak Talukdar, **Vanamali C. Shastry**, Udit Raha, and Fred Myhrer. Lepton-Proton Two-Photon Exchange in Chiral Perturbation Theory. Phys. Rev., D101(1):013008, 2020, arxiv:1912.06843.

19. V. K. Nilakanthan, **C. S. Vanamali**, S. Raghavendra, and K. B Vijaya Kumar. Investigation of nucleon nucleon interaction with confined one gluon exchange potential and one pion exchange potential. Indian J. Pure Appl. Phys., 57(08):536–539, 2019.

20. V. K. Nilakanthan, **V. C. Shastry**, S. Raghavendra, and K. B. Vijaya Kumar. Role of confined gluons and pions in nucleon-nucleon interaction. Eur. Phys. J Plus, 134: 517, 2019, arxiv:1809.00539.

21. **Vanamali C. Shastry** and K. B. Vijaya Kumar. Effects of Finite Size of Constituent Quarks on Nucleon-Nucleon Interaction. J. Phys., G46(6):065101, 2019, arxiv:1807.09008.

22. **C. S. Vanamali** and K. B. Vijaya Kumar. Nucleon-nucleon interaction with one-pion exchange and instanton-induced interactions. Phys. Rev., C94(5):054002, 2016.

Pre-prints/Whitepapers:

1. A. Afanasev, *et al.*, CFNS Ad-Hoc meeting on Radiative Corrections Whitepaper, arxiv:nucl-th/2012.09970.

2. Francesco Giacosa and **Vanamali Shastry**, Scattering off unstable states, arxiv:2507.03145.

Conference proceedings:

1. Francesco Giacosa and **Vanamali Shastry**, Sill distribution: genesis and salient features, Nuovo Cim.C 47, 186, 2024, arxiv: 2310.06346

2. Wojciech Broniowski, **Vanamali Shastry**, and Enrique Ruiz Arriola, Off-shell Generalized Parton Distributions of the Pion, Acta Phys.Polon.Supp. 16, 7-A7, 2023, arxiv:2304.02097

3. **Vanamali Shastry**, The hybrid nonet of $\pi_1(1600)$ and $\eta_1(1855)$: analysis and predictions for the kaonic members, PoS(ICHEP2022)779, arxiv:2211.10230

4. **Vanamali Shastry**. Ratios of Partial Wave Amplitudes in the Decays of $J = 1$ and $J = 2$ Mesons. Rev.Mex.Phys.Suppl., 3, 0308055, 2022, arxiv:hep-ph/2112.13221.

5. **Vanamali C. Shastry** and K. B. Vijaya Kumar. Finite size of constituent quarks and nucleon nucleon interaction. In Proceedings, 63rd DAE-BRNS Symposium on Nuclear Physics: BARC, India, 10-14 December 2018, volume 63, pages 822-823, 2018.

6. S. Raghavendra, V. K. Nilakanthan, **C. S. Vanamali**, and K. B Vijaya Kumar. Effect of Confined One Gluon Exchange and Instanton Induced Interaction on Nucleon Nucleon Interaction. In Proceedings, 62nd DAE-BRNS Symposium on Nuclear Physics: Patiala, India, 20-24 December 2017, volume 62, pages 758-760, 2017.

7. V. K. Nilakanthan, S. Raghavendra, **C. S. Vanamali**, and K. B Vijaya Kumar. Effect of Confined One Gluon Exchange and One Pion Exchange on Nucleon Nucleon Interaction. In Proceedings, 62nd DAE-BRNS Symposium on Nuclear Physics: Patiala, India, 20-24 December 2017, volume 62, pages 754-756, 2017.

8. **C. S. Vanamali** and K. B Vijaya Kumar. Nucleon - Nucleon Interaction with One - Pion Exchange and Instanton Induced Interaction. In Proceedings, 61st DAE-BRNS Symposium on Nuclear Physics: Kolkata, India, 5-9 December 2016, volume 61, pages 670-671, 2016.

Conferences and Workshops attended

1. "15th Conference on the Intersections of Particle and Nuclear Physics (CIPANP 2025)", June 9-13, 2025, University of Wisconsin, Madison, USA.

2. "Modern Techniques in Hadron Spectroscopy", July 15-26, 2024, Ruhr University Bochum, Germany.

3. "The 10th International Conference on Quarks and Nuclear Physics (QNP2024)", Jul 8-12, 2024, Universitat de Barcelona, Spain.

4. "International Workshop on Partial Wave Analyses and Advanced Tools for Hadron Spectroscopy (PWA13/ATHOS8)", May 28 - Jun 1, 2024, College of William & Mary, USA.

5. "5th Workshop on Future Directions in Spectroscopy Analysis (FDSA2024)", Jan 22-24, 2024, Università di Genova, Italy.

6. "Excited QCD 2024 Workshop", Jan 14-20, 2024, Benasque Science Center, Spain.

7. "XXIX The Cracow Epiphany Conference", January 16-19, 2023 hosted by IFJ-PAN, Kraków, Poland

8. "EuNPC 2022: European Nuclear Physics Conference", October 24-28, 2022 hosted by Universidade de Santiago de Compostela, Spain.

9. "Confinement XV: XV Quark Confinement and the Hadron Spectrum Conference", August 1-6, 2022 hosted by University of Stavanger, Norway.

10. "ICHEP2022: International Conference on High Energy Physics", July 6-13, 2022 hosted by University of Bologna, Italy.

11. "DIS2022: XXIX International Workshop on Deep-Inelastic Scattering and Related Subjects", May 2-6, 2022 hosted by Universidade de Santiago de Compostela, Spain.

12. "STRONG2020: Second Strong2020 online workshop", September 14-16, 2021 (online).

13. "19th International Conference on Hadron Spectroscopy and Structure in memoriam Simon Eidelman (HADRON 2021)", July 26-31, 2021 hosted by Universidad Nacional Autónoma de México (online).

14. "Bad Honnef School on Methods of Effective Field Theory and Lattice Field Theory", July 12-30, 2021 (online).

15. "FunQCD: from first principles to effective theories", March 29 - April 1, 2021 (online) by University of Valencia.

16. "CNT Workshop on Effective Field Theory of Hadrons: Vacuum to Medium", March 12-17, 2018 at Variable Energy Cyclotron Center, Kolkata.

17. GIAN course on Electroweak Symmetry Breaking, Flavour Physics and Beyond Standard Model, December 18-22, 2017 at Indian Institute of Technology Guwahati.

18. XXIX SERC Main School in Theoretical High Energy Physics, December 20, 2014 to January 8, 2015, Department of Physics, BITS-Pilani, Goa Campus.

Talks Delivered

1. "Amplitude analyses in hadron spectroscopy experiments", at CIPANP on 11 June, 2025.

2. "Spin density matrix elements in polarized photoproduction of resonances", at QNP2024 on 10 July, 2024.

3. "Spin density matrix elements of the $\Delta^{++}(1232)$", at PWA13/ATHOS8 on 01 June, 2024.

4. "Spin density matrix elements from the photoproduction of the Delta++ (1232)", at Excited QCD 2024 on 16 Jan, 2024.

5. "Toward a nonet of hybrid mesons: strong and radiative decays", at XXIX The Cracow Epiphany Conference on 19 Jan, 2023.

6. "Partial wave analysis of the two-body decays of mesons", at Departamento de Física Atómica, Molecular y Nuclear, Universidad de Granada on 25 Nov, 2022.

7. "Spectrum and decays of the light 1^{-+} hybrid nonet" at EuNPC 2022 on 25 Oct, 2022.

8. "The phenomenology of the nonet of the $\pi_1(1600)$ and $\eta_1(1855)$" at Confinement XV Conference on 4 Aug, 2022.

9. "The hybrid nonet of $\pi_1(1600)$ and $\eta_1(1855)$: analysis and predictions" at ICHEP2022 on 9 Jul, 2022.

10. "The exotic $\pi_1(1600)$, $\eta_1(1855)$ and their siblings" at the Institute for Theoretical Physics, Justus-Liebig-University, Giessen on 18 May, 2022.

11. "Partial wave analysis of the two-body decays of mesons." at Jan Kochanowski University, Kielce on 19 Jan, 2022.

12. "Ratios of Partial Wave Amplitudes in the Decays of $J = 1$ and $J = 2$ Mesons." at the HADRON2021 Conference on 29 Jul, 2021.

13. "Lepton-Proton Scattering and the Proton Radius Puzzle." at Jan Kochanowski University, Kielce on 07 Apr, 2021.

14. "Low Energy Lepton-Proton Scattering: An EFT Approach." at IIT Guwahati on 30 Apr, 2019.

15. "Resonating Group Method - Overview and Applications" at IIT Guwahati on 14 Nov, 2018.

16. "Constituent Quark Model and Nucleon - Nucleon Interaction." at IIT Guwahati on 19 Jun, 2018.

17. "Nucleon - Nucleon Interaction" at Physical Research Laboratory, Ahmadabad on 15 Feb, 2018.

Research Experience

- **Adiunkt** (postdoctoral fellow), Institute of Physics, Jan Kochanowski Unviersity in Kielce, Kielce, Poland, **March, 2021 - May, 2023**.
- **Postdoctoral appointee**, Center for Exploration of Energy & Matter, Indiana University Bloomington, Bloomington, IN, USA, **June, 2023 - present**.

Teaching Experience

- **Guest Faculty**, Department of Education in Science and Mathematics, Regional Institute of Education, Mysuru, India, **August 26, 2020 - February 3, 2021**.

  Courses taught:

  Master degree: Classical Mechanics

- **Assistant Professor (contractual)**, Department of Education in Science and Mathematics, Regional Institute of Education, Mysuru, India, **June 18, 2019 - April 17, 2020**.

  Courses taught:

  Bachelor degree: Mechanics, Classical & Quantum Mechanics & Special Theory Of Relativity, Computational Physics.

  Master degree: Classical Electrodynamics, Nuclear Physics

- **Guest Faculty**, Department of Physics, Mangalore University, Mangalore, India, during the academic years **2012-13, 2015-16, 2016-17** and **2018-19**.

  Courses taught (Master degree only):

  Basic Electronics (including FORTRAN programming), Mathematical Methods, Statistical Mechanics, Nuclear Physics, Special and General Theory of Relativity.

References

Dr. K B Vijaya Kumar
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Other Responsibilities

1. Center Coordinator for **National Graduate Physics Examination (NGPE) - 2020** organized by the Indian Association of Physics Teachers (IAPT).

2. Resource person in the Workshop on **"Translating Materials in to Southern Languages"** organized from 24^{th} to 28^{th} February, 2020 at Regional Institute of Education, Mysore.

3. Resource person for the research study titled **"Implementing Interventions at Elementary & Secondary School Stage: A Block Level Research Project"** for the academic year 2019-20, funded by the Ministry of Human Resource Development (MHRD), Govt. of India and implemented by the National Council for Education Research and Training (NCERT).
