Curriculum Vitae

Dr. Ratan Kumar Singh
Temporary Assistant Professor,
Department of Physics, Faculty of Science,
The Maharaja Sayajirao University of Baroda
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➢ *Personal Profile*

Name	Ratankumar Keshav Singh
Residence Address	1214-Krishna Nagar Society 2 Karodia Road Bajwa, Vadodara 391310 Gujarat India.
Nationality	Indian
Languages	English, Hindi, Gujarati

➢ *Research Interests*

Nuclear reactions close to Coulomb barrier, Nuclear reactions for astrophysical interest (s-process, r-process and p-process), Monte Carlo Simulation, γ-ray spectrometry, thermonuclear reaction rate.

➢ *Education*

2024 **Ph.D. in Experimental Nuclear Physics**
Ph.D. thesis title: "Investigation of Neutron Induced Reaction Cross sections for Nuclear Data Applications"
Advisor: Prof. N. L. Singh
Department of Physics, Faculty of science,
The Maharaja Sayajirao University of Baroda Vadodara-390002 Gujarat India

2014 **M.Sc. in Nuclear Physics**
Dissertation project: "Measurement of cross section of Molybdenum using $(n, 2n)$ and (n, γ) Nuclear Reaction"
Advisor: Prof. S. K. Mukherjee
Department of Physics, Faculty of science,
The Maharaja Sayajirao University of Baroda Vadodara-390002 Gujarat India

2012 **B.Sc. in Physics**
Department of Physics, Faculty of science,
The Maharaja Sayajirao University of Baroda Vadodara-390002 Gujarat India

➢ *Awards and Achievements*

Dec-2018 **Gujarat Set Eligibility Test** (GSET) for Assistant Professor in Physical Science.

May-2014 **Late Dr. Jatush Vipinchandra Sheth Gold Medal** in M.Sc. Nuclear Physics, The Maharaja Sayajirao University of Baroda, Vadodara Gujarat India.

➢ *School, Conferences and Workshops*

Nov-2024 **"Faculty Development Program (FDP)"** The Maharaja Sayajirao University of Baroda, Vadodara, Gujarat, India.

Jul-2021 **PHITS** (**P**article and **H**eavy **I**on **T**ransport Code **S**ystem) advance course tutorial, the Japan Atomic Energy Agency, Nuclear Science and Engineering

Nov-2019 **"DAE-BRNS Workshop on Compilation of Experimental Nuclear Reaction Data",** The Maharaja Sayajirao University of Baroda, Vadodara Gujarat India

April-2018 **"Ph.D. Teaching Programme Course Module 624B Nuclear Models-II",** Inter University Accelerator Centre (IUAC), New Delhi, India.

Dec-2018 **"DAE International Symposium on Nuclear Physics",** Bhabha Atomic Research Centre (BARC), DAE Convention Centre, Anushaktinagar, Mumbai, India.

Oct-2017 **"International Conference on High Energy Radiation and Applications"**, The Maharaja Sayajirao University of Baroda, Vadodara, Gujarat, India.

Nov-2017 **"IUAC School on Nuclear Reactions",** Inter University Accelerator Centre (IUAC), New Delhi, India.

Dec-2017 **"Fourth DAE-BRNS Theme Meeting on Generation and Use of Covariance Matrices in the Application of Nuclear Data",** Manipal University Karnataka, India.

Dec-2017 **"62nd DAE-BRNS Symposium on Nuclear Physics",** Thapar Institute of Engineering & Technology, Patiala, India.

Jun-2016 **"Modern Education System Multidisciplinary Perspective"**, The Maharaja Sayajirao University of Baroda, Vadodara, Gujarat, India.

Nov-2016 **"Special Lectures on Nuclear Reactions Close to Coulomb Barrier"**, Prof. Hans-Jürgen Wollersheim GSI/FAIR, Darmstadt, Germany, Inter University Accelerator Centre (IUAC), New Delhi, India.

Oct-2015 **"DAE-BRNS Workshop on MOnte carlo Nucleon Transport Code (MONC)"** HBNI, Anushaktinagar, Mumbai, India.

Jan-2014 **"Innovations in Science and Technology"**, The Maharaja Sayajirao University of Baroda, Vadodara, Gujarat, India.

Dec-2014 Indo-Czech Cooperation **"Workshop on Monte Carlo Simulation and Applications"**, The Maharaja Sayajirao University of Baroda, Vadodara Gujarat India.

➢ *Academic and Research Experiences*

2021-Present **Temporary Assistant Professor (TAP)**, Department of Physics, Faculty of Science, The Maharaja Sayajirao University of Baroda, Vadodara, Gujarat, India,

2016-2019 **Project Fellow,** "Study of Heavy Ion Induced Fusion/Fission Reactions around Coulomb Barrier" IUAC-UGC/XIII.7/UFR-60321, Department of Physics, Faculty of Science, The Maharaja Sayajirao University of Baroda, Vadodara, Gujarat, India

2015-2016 **Temporary Teaching Assistant (TTA)**, Department of Physics, Faculty of Science, The Maharaja Sayajirao University of Baroda, Vadodara, Gujarat, India.

➢ *Publications in peer reviewed journals*

1. **R. K. Singh,** N. L. Singh, Rajnikant Makwana, Mayur Mehta, P. Bangotra, H. Kumawat, R. D. Chauhan, Vibhut Vashi, Vishal, Jyoti Shankar, K. Katovsky
   Systematic study of the proton induced reactions on ^{98}Mo and ^{100}Mo isotopes with the unscented transform Kalman filter technique
   (Data analysis for this paper is under process)
2. Namrata Singh; Mahesh Choudhary; A. Gandhi; Mahima Upadhyay; **R. K. Singh;** Akash Hingu; G. Mishra; Sukanya De; L.S. Danu; Ajay Kumar; R.G. Thomas; Sauroov Sood; Sajin Prasad; B. Lalremruata; K. Katovsky; A. Kumar
   Study of the uncertainty quantification of the ^{121}Sb(n,γ)^{122}Sb reaction
   (Accepted for publication in The European Physical Journal Plus)
3. Vandana, Shivani Sharma; Pargin Bangotra; N.L. Singh; Mayur Mehta; R.K. Singh; R.J. Makwana; Mitul Abhangi; Ratnesh Kumar; Himanshu Sharma; Sudhirsinh Vala; K. Katovsky
   Estimation of isomeric cross section and covariance analysis of ^{90}Zr induced by deuterium- tritium fusion neutrons
   (Submitted in Journal of Radioanalytical and Nuclear Chemistry)
4. Shivani Sharma; Vandana, N.L. Singh, Mayur Mehta; R.K. Singh; R.J. Makwana; Mitul Abhangi; Ratnesh Kumar; Himanshu Sharma; Sudhirsinh Vala; K. Katovsky
   Analysis of neutron induced reaction cross-section on ^{121,123}Sb isotopes at neutron energy of 14.96 ± 0.03 MeV
   (Submitted in Applied Radiation and Isotopes)
5. Mayur Mehta, N. L. Singh, A. Gandhi, P.V. Subhash, Rebecca Pachuau, **Ratan Kumar Singh,** R. Makwana, S.V. Suryanarayana, B. K. Nayak, H. Naik, Karel Katovsky

Neutron capture cross section of ^{186}W isotope in the energy range from 0.6-3.2 MeV with covariance analysis
(Under Review in Radiation Physics and Chemistry)

6. Vishal Unagar, Rajnikant Makwana, S. S. Barala, D. Meena, S. K. Gupta, Y. Kavun, M. Mehta, V. Vashi, **R. K. Singh,** R. Chauhan, S. K. Mukherjee, N. L. Singh, K. Katovsky
   Monte Carlo analysis of HDPE using PHITS and MCNP for neutron shielding applications Journal of Radioanalytical and Nuclear Chemistry, Vol. 333, 5457–5464 (2024).
7. Mayur Mehta, N.L. Singh, **Ratankumar Singh,** R. Makwana, P.V. Subhash, Rakesh Chauhan, B. K. Soni, S.V. Suryanarayana, H. Naik, R. Palit, K. Katovsky
   Activation cross section for ^{85}Rb$(n,p)^{85m}$Kr and ^{85}Rb$(n,2n)^{84m}$Rb reactions with uncertainty propagation and covariance analysis
   Journal of Radioanalytical and Nuclear Chemistry, Vol, 333, 5231–5241, (2024).
8. Rakesh Chauhan, **R. K. Singh,** N. L. Singh, Mayur Mehta, Rajnikant Makwana, S. V. Suryanarayana, S. Mukherjee, B. K. Nayak, H. Naik, J. Varmuza, K. Katovsky
   Measurement of ^{64}Zn$(n,2n)$ and ^{67}Zn(n,p) reaction cross sections at neutron energies of 17.10±0.82 and 14.98±0.81 MeV
   Journal of Radioanalytical and Nuclear Chemistry (2024).
9. **R. K. Singh,** N. L. Singh, Mayur Mehta, Rakesh Chauhan, H. Kumawat, Rajnikant Makwana, S. V. Suryanarayana, B. K. Nayak, H. Naik, J. Varmuza, and K. Katovsky
   Experimental and theoretical study of the ^{65}Cu$(n,p)^{65}$Ni reaction cross section from reaction threshold up to 25 MeV, Phys. Rev. C. 107, 054607 (2023)
10. **R. K. Singh,** N. L. Singh, Mayur Mehta, Rakesh Chauhan, S. V. Suryanarayana, Rajnikant Makwana, B. K. Nayak, H. Naik, J. Varmuza, K. Katovsky
    Activation cross section for the $(n,2n)$ and (n,p) reactions on ^{103}Rh, ^{48}Ti and ^{52}Cr from reaction threshold up to 25 MeV energy region, Applied Radiation and Isotopes 200, 110949 (2023)
11. Vibhuti Vashi, Rajnikant Makwana, B. Quintana, M. H. Mehta, **R. K. Singh,** B. K. Soni, R. Chauhan, S. Mukherjee, M. Abhangi, S. Vala, N. L. Singh, G. B. Patel, S. V. Suryanarayana, B. K. Nayak, S. C. Sharma, T. N. Nag, Y. Kavun
    Systematic study of (p,n) and $(p,2n)$ reactions on ^{110}Cd,
    Radiation Physics and Chemistry 21, 110933 (2023)
12. **R. K. Singh,** N. L. Singh, R. D. Chauhan, Mayur Mehta, S. V. Suryanarayana, Rajnikant Makwana, B. K. Nayak, H. Naik, Tarak Nath Nag, J. Varmuza
    Systematic study of the $(n,2n)$ reaction cross section for ^{121}Sb and ^{123}Sb isotopes,
    Chin. Phys. C Vol. 46, No. 5, 054002 (2022)
13. Mayur Mehta, N. L. Singh, **Ratankumar Singh,** Rakesh Chauhan, Rajnikant Makwana, S. V. Suryanarayana, H. Naik, P. V. Subhash, S. Mukherjee, Jan Varmuza, Karel Katovsky
    Cross-section of $(n,2n)$ reaction for niobium and strontium isotopes between 13.97 to 20.02 MeV neutron energies, Applied Radiation and Isotopes, Vol. 182, 110142 (2022)
14. C. Joshi, H. Kumawat, **R. K. Singh**, N. L. Singh, D. Patel, B. K. Nayak, J. Acharya, A. Parihari, K. Rani, S. D. Sharma, G. Kaur, I. Ahmed, K. S. Golda, N. Saneesh, M. Kumar, A. Jhingan, P. Sugathan
    Exploring breakup coupling effect in ^{7}Li+^{92,100}Mo elastic scattering around Coulomb barrier energies, Eur. Phys. J. A. 58:40 (2022)

15. Vibhuti Vashi, Rajnikant Makwana, B. Quintana, M. H. Mehta, B. K. Soni, S. Mukherjee, **R. K. Singh,** R. Chauhan, P. M. Prajapati, M. Abhangi, S. Vala, N. L. Singh, G. B. Patel, S. V. Suryanarayana, B. K. Nayak, S. C. Sharma, T. N. Nag, and Y. Kavun
    Cross-section measurement of the ^{114}Cd$(p,\gamma)^{115m}$In reaction for nuclear reactor and astrophysical applications, Phys. Rev. C. 105, 044613 (2022)
16. C. Joshi, H. Kumawat, V. V. Parkar, D. Dutta, S. V. Suryanarayana, V. Jha, **R. K. Singh,** N. L. Singh, and S. Kailas
    Inclusive α production for the ^{6}Li + ^{51}V system, Phys. Rev. C 105, 034615 (2022)
17. **R. K. Singh,** N. L. Singh, R. D. Chauhan, Mayur Mehta, S. V. Suryanarayana, Rajnikant Makwana, S. Mukherjee, B. K. Nayak, H. Naik, Tarak Nath Nag, J. Varmuza, K. Katovsky
    Neutron induced reaction cross section of ^{51}V with covariance analysis, Eur. Phys. J. A 57:337 (2021)
18. **R. K. Singh,** N. L. Singh, R. D. Chauhan, Mayur Mehta, S. V. Suryanarayana, Rajnikant Makwana, S. Mukherjee, B. K. Nayak, H. Naik, J. Varmuza, K. Katovsky
    Cross sections for the (n,p) reaction of selenium isotopes within 10.5 to 19.81 MeV neutron energies, Eur. Phys. J. Plus, 136:338 (2021)
19. Vibhuti Vashi, Rajnikant Makwana, S. Mukherjee, B. K. Soni, M. H. Mehta, S. Parashari, **R. K. Singh,** R. Chauhan, S. V. Suryanarayana, B. K. Nayak, S. C. Sharma, H. Naik, N. L. Singh, T. N. Nag
    Measurement of cross sections for flux monitor reactions using quasi-monoenergetic neutrons, Eur. Phys. J. Plus, 136:746 (2021)
20. Rakesh Chauhan, **R. K. Singh,** N. L. Singh, Mayur Mehta, Rajnikant Makwana, S. V. Suryanarayana, S. Mukherjee, B. K. Nayak, H. Naik, J. Varmuza, K. Katovsky
    Study of $(n,2n)$ reaction cross sections for ^{107}Ag within the energy range of 9–22 MeV, Eur. Phys. J. Plus, 136:532 (2021)
21. Mayur Mehta, N. L. Singh, **R. K. Singh,** Siddharth Parashari, P. V. Subhash, H. Naik, R. D. Chauhan, R. Makwana, S. V. Suryanarayana, S. Mukherjee, A. Gandhi, J. Varmuza, K. Katovsky
    Measurement of ^{90}Zr$(n,2n)^{89}$Zr and ^{90}Zr$(n,p)^{90m}$Y reaction cross sections in the neutron energy range of 10.95 to 20.02 MeV, Journal of Radioanalytical and Nuclear Chemistry 328:71-81, (2021)
22. H. Kumawat, C. Joshi, V. V. Parkar, V. Jha, B. J. Roy, Y. S. Sawant, P. C. Rout, E. T. Mirgule, **R. K. Singh**, N. L. Singh, B. K. Nayak, S. Kailas
    Elastic scattering for ^{6}Li+^{51}V and systematic study of breakup threshold anomaly,
    Nuclear Physics A Vol. 1002, 121973 (2020)
23. Mayur Mehta, N. L. Singh, R. Makwana, P. V. Subhash, S. V. Suryanarayana, S. Parashari, Rakesh Chauhan, **R. K. Singh,** H. Naik, S. Mukherjee, B. Soni, S. Khirwadkar, J. Varmuza & K. Katovsky
    Measurement of (n,γ) reaction cross section of ^{186}W-isotope at neutron energy of 20.02±0.58 MeV, Indian Journal of Pure and Applied Physics, Vol. 58, 392-396 (2020)
24. Nidhi Shetty, Rajnikant Makwana, Mayur Mehta, S. Mukherjee, N. L. Singh, S. V. Suryanarayana, S. Parashari, **R. Singh,** H. Naik, S. C. Sharma, S. Ayyala, B. Soni, R. Chauhan

Measurement of neutron induced $^{86}Sr(n,2n)^{85}Sr$ reaction cross sections at different neutron energies, Applied Radiation and Isotopes, Volume 154, 108866 (2019)

➢ *Publications in National and International Conference Proceedings*

1. N. L. Singh, P. Bangotra, S. V. Suryanarayana, B. K. Nayak, H. Naik, **R. K. Singh,** M. Mehta, R. Makwana, Rakesh Chauhan, V. Vashi, Karel Katovsky, Jan Varmuza, Systematic study of the (n, p) reaction cross section on ^{112}Cd isotope from reaction threshold to 20 MeV energies, 23rd International Scientific Conference on Electric Power Engineering (EPE) 2023.
2. Vibhuti Vashi, R. Makwana, S. Mukherjee, B. Soni, M. H. Mehta, S. Parashari, **R. K. Singh,** S. V. Suryanarayana, B. K. Nayak, S. C. Sharma, H. Naik, Tarak Nath
   Measurement of reaction cross-section for $^{197}Au(n,2n)^{196}Au$ reaction, Proceedings of the DAE Symp. On Nucl. Phys. Vol. 64, B31-381 (2019).
3. **R. K. Singh,** R. D. Chauhan, S. V. Suryanarayana, Rajnikant Makwana, S. K. Mukherjee, Mayur Mehta, Tarak Nath, Bhargav Soni
   Neutron nuclear data of $(n,2n)$ reaction for Sb Isotopes, Proceedings of the DAE Symp. On Nucl. Phys. Vol. 64, B123-565 (2019).
4. Siddharth Parashari, S. Mukherjee, H. Naik, S. V. Suryanarayana, Rajnikant Makwana, Mayur Mehta, **Ratan Kumar,** N. L. Singh, and Sai Akhil Ayyala
   Measurement of $^{100}Mo(n,2n)^{99}Mo$ reaction cross sections using 10-20 MeV quasi-monoenergetic neutrons, 19th International Scientific Conference on Electric Power Engineering (EPE) 2018.
5. Siddharth Parashari, S. Mukherjee, S. V. Suryanarayana, R. Makwana, B. K. Nayak, **Ratan K. Singh,** S. C. Sharma, M. Mehta, N. L. Singh, H. Naik
   Production cross-section of the ^{99m}Tc medical isotope by using the $^{nat}Mo(p,2n)$ reaction, Proceedings of the DAE Symp. On Nucl. Phys. Vol. 63, B42-464 (2018).
6. Bhargav K. Soni, Siddharth Parashari, S. Mukherjee, S. V. Suryanarayana, R. Makwana, B. K. Nayak, **Ratan K. Singh,** S. C. Sharma, M. Mehta, N. L. Singh, and H. Naik
   Measurement of the $^{115}In(n,2n)^{114m}In$ reaction cross-section using the quasi-monoenergetic neutrons, Proceedings of the DAE Symp. On Nucl. Phys. Vol. 63, B43-466 (2018).
7. Nidhi Shetty, Rajnikant Makwana, Mayur Mehta, N. L. Singh, S. Mukherjee, S. V. Suryanarayana, Siddharth Parashari, **Ratan Kumar,** Sai Akhil Ayyala, Chandni Menpara
   Measurement of neutron induced reaction cross-sections for ^{86}Sr at different neutron energies, Proceedings of the DAE Symp. On Nucl. Phys. Vol. 63, B108-596 (2018).

8. Rakesh Chauhan, **Ratan Kumar Singh,** Rajnikant Makwana, N. L. Singh, S. Mukherjee, H. Naik, Mayur Mehta, B. K. Soni, S.V. Suryanarayana
   Measurements of cross section of ^{160}Gd$(n, 2n)^{159}$Gd reaction at energies of 10.72, 14.72 and 18.72 MeV, Proceedings of the DAE Symp. On Nucl. Phys. Vol. 63, B138-656 (2018).
9. Golda K. S., H Singh, C. Yadav, Mohit Kumar, N. Saneesh, A. Jhingan, Kavita Chouhan, R. Kumar, R. R. Dubey, Abhishek Yadav, Neeraj Kumar, A. Banerjee, Anjali Rani, Kavita Rani, J. R. Acharya, **Ratan,** S. Noor, S. K. Duggi, P. Sugathan
   Entrance Channel Dependence of fusion-fission Dynamics in mass ~200 region, Proceedings of the DAE Symp. On Nucl. Phys. Vol. 63, B150-680 (2018).
10. Ratankumar Singh, Rakesh Chauhan, N. L. Singh, S. V. Suryanarayana, Siddharth Parashari, Rajnikant Makwana, S. K. Mukherjee, Mayur Mehta, Sai Akhil Ayyala, S. C. Sharma
    Measurement of ^{78}Se$(n, p)^{78}$As reaction cross-sections at different neutron energies, Proceedings of the DAE Symp. On Nucl. Phys. Vol. 63, B159-698 (2018).
11. Mayur Mehta, N. L. Singh, P.V. Subhash, Rajnikant Makwana, Rakesh Chauhan, **Ratankumar Singh,** H. Naik, S. Mukherjee, S. V. Suryanarayana, Vibha Vansola, Y. Santhi Sheela, Mitul Abhangi, Sudhirsingh Vala, Naveen Agrawal, Nidhi Shetty, R. Acharya
    Measurement of ^{93}Nb$(n, 2n)^{92}$Nb cross-section at different neutron energies, Proceedings of the DAE Symp. On Nucl. Phys. Vol. 63, B163-706 (2018).
12. C. Joshi, H. Kumawat, V. V. Parkar, V Jha, B. J. Roy, Y. S. Sawant, P. C. Rout, E. T. Mirgule, R. Tripathi, **R. K. Singh,** N. L. Singh, B. K. Nayak
    Reaction dynamics of weakly bound stable projectile for system ^{6}Li+^{51}V, Proceedings of the DAE Symp. On Nucl. Phys. Vol. 63, B169-718 (2018).
13. Siddharth Parashari, S. Mukherjee, H. Naik, S.V. Suryanarayana, Rajnikant Makwana, Mayur Mehta, **Ratan Kumar,** N. L. Singh, Sai Akhil Ayyala
    Measurement of ^{100}Mo$(n, 2n)^{99}$Mo reaction cross-sections, Proceedings of the DAE Symp. On Nucl. Phys. Vol. 62, B20-400 (2017).
14. Chhavi Joshi, **Ratan K. Singh,** Siddharth Parashari, Mayur Mehta, Rakesh Chauhan, Rajnikant Makwana, S. K. Mukherjee, N. L. Singh
    Measurement of the cross-section ^{107}Ag$(n, 2n)^{106m}$Ag reaction on neutron energy 13 MeV and 22 MeV, Proceedings of the DAE Symp. On Nucl. Phys. Vol. 62, B125-610 (2017).
15. **Ratan Kumar Singh,** Parasari Siddharth, N. L. Singh, Rajnikant Makwana, S. K Mukherjee, Mayur Mehta, Sai Akhil, Chhavi Joshi

Cross-section measurement of the ^{103}Rh$(n,2n)^{102}$Rh reaction at 22 MeV Energy, Proceedings of the DAE Symp. On Nucl. Phys. Vol. 62, B135-630 (2017).

http://www.sympnp.org/proceedings/

➢ *Computational knowledge*

Nuclear Reaction Simulation Codes: *AZURE (R-matrix), TALYS, EMPIRE, ALICE and CCFULL*

Operating System: Linux and Windows Software: *MS Office, Latex, Jupyter Notebook, Origin, Mathematica and Matlab*

Programming Language: *Python, Data Science and Machine learning (Register as a learning student in Coding Ninja)*

➢ *Students guided*

Three postgraduate students are guided for six months master thesis, and four undergraduate students are guided for two summer internships.

➢ *Professional Memberships*

Physical Society, The Maharaja Sayajirao University of Baroda, Vadodara Gujarat India.

Indian Association of Physics Teachers (IAPT), India.