

Curriculum Vitae

Dr. M. Hemalatha

UGC Assistant Professor, Department of Physics, University of Mumbai

Personal

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Educational Qualifications

1. Ph.D. (Science) – Nuclear Physics, 2005, Thesis: “Study of Exotic Nuclei”, Bhabha Atomic Research Centre (BARC), Mumbai. Degree awarded by University of Mumbai, Mumbai.
2. M. Sc. (Physics) - First Class, 2000, University of Mumbai, Mumbai.

Employment History

- o UGC Assistant Professor, Department of Physics, University of Mumbai, Mumbai, India, till date
- o Assistant Professor, University of Mumbai-Department of Atomic Energy Centre for Excellence in Basic Sciences, Mumbai, India
- o Research Associate, UM-DAE Centre for Excellence in Basic Sciences, Mumbai, India
- o Visiting Scientist, Institut de Physique Nucléaire (IPN)-Orsay, France
- o Post-Doctoral Fellow, Physics Department, Indian Institute of Technology, I.I.T. – Bombay, Mumbai, India
- o Visiting Scientist, Atomic Physics Department, GSI, Darmstadt and Department of Chemistry, Mainz University, Mainz, Germany
- o Department of Atomic Energy (DAE) Research Fellow, Bhabha Atomic Research Centre, Mumbai, India

Academic Awards and Recognition

- o **UGC Faculty Recharge Program selectee**, 2017, University Grants Commission, Government of India.
- o **Young Scientist Research Award (YSRA-2012)**, Department of Atomic Energy (DAE) - Board of Research in Nuclear Sciences (BRNS), Government of India.
- o **DAE Research Fellow, 2000-2005**, Department of Atomic Energy (DAE), Government of India.

Grants funding obtained

- o **Principal Investigator for Core Research grant** for the project, Science and Engineering Research Board (SERB), Department of Science and Technology (DST), Government of India.
- o **UGC Start-up grant**, University Grants Commission, Government of India.
- o **Principal Investigator under Young Scientist Research Award (YSRA)**, Department of Atomic Energy (DAE) - Board of Research in Nuclear Sciences (BRNS), Government of India.
- o **Co-Principal Investigator for Research grant for the project**, Department of Atomic Energy (DAE) - Board of Research in Nuclear Sciences (BRNS), Government of India.

Research Areas:

My principal area of research is the experimental and theoretical understanding of stable as well as nuclei away from the line of stability. My research interests are interdisciplinary.

- (1) Experimental and Computational Nuclear Physics: Proton-induced reactions for medical applications, Nuclear transmutation of long-lived fission fragments and Nuclear Astrophysics
- (2) Theoretical Nuclear Physics: Correlation between nuclear charge radii and reaction cross sections
- (3) Experimental Nuclear Physics: Laser Spectroscopy of stable nuclei and nuclei away from stability

Papers in International Peer Reviewed Journals:

- Nuclear charge radii of $^{46-62}\text{Cr}$ isotopes and reaction cross sections for $p\text{-Cr}$, ***M. Hemalatha*, Physical Review C 106, (2022).**
- Successive neutron alignments in the yrast negative-parity band of oblate-deformed ^{199}Tl , Saket Suman, S.K. Tandel, S.G. Wahid, T. Manu, ***M. Hemalatha*, B. Maheshwari, A.K. Jain, P. Chowdhury, R.V.F. Janssens, F. G. Kondev, M.P. Carpenter, T. Lauritsen, and D. Seweryniak, Physical Review C 106, 024316 (2022).**
- Excitation functions of the $\text{Zn}(p,xn)\text{Ga}$ reactions, ***M. Hemalatha*, A. Patel, S. Kailas, Applied Radiation and Isotopes, 156, 108968 (2020).**
- Nanosecond isomers and the evolution of collectivity in stable, even- A Hg isotopes, Saket Suman, S. K. Tandel, Ankit Kumawat, S. G. Wahid, M. Hemalatha, P. Chowdhury, R.V.F. Janssens, M.P. Carpenter, T.L. Khoo, F.G. Kondev, T. Lauritsen, C.J. Lister, D. Seweryniak, and S. Zhu, **Physical Review C 103, 014319 (2021).**
- Metastable states from multi-nucleon excitations in ^{202}Tl and ^{203}Pb , S.G. Wahid, S.K. Tandel, Saket Suman, ***M. Hemalatha*, Anurag Patel, Poulomi Roy, A.Y. Deo, Pragati, P.C. Srivastava, Bharti Bhoj, S.S. Bhattacharjee, R.P. Singh, S. Muralithar, P. Chowdhury, R.V.F. Janssens, M.P. Carpenter, T.L. Khoo, F.G. Kondev, T. Lauritsen, C.J. Lister, D. Seweryniak, S. Zhu, S. Rai, A. Sharma, Physical Review C 102, 024329 (2020).**
- High-resolution energy and fast timing measurements for nuclear spectroscopy using digital signal processing, S.K. Tandel, D. Negi, S.G. Wahid, Saket Suman, A. Patel, Poulomi Roy, ***M. Hemalatha*, D.C. Biswas, M. Venaruzzo, C. Tintori, 2020 Journal of Instrumentation 15 P08013.**
- Prediction of reaction cross section for $p\text{-Cr}$, ***M. Hemalatha*, N. Maladkar and S. Kailas, European Physical Journal, 107, 08006 (2016).**
- Verification of the sputter-generated $^{32}\text{SFn-}$ ($n=1-6$) anions by accelerator mass spectrometry, R.G. Mane, P. Surendran, Sanjay Kumar, J.P. Nair, M.L. Yadav, ***M. Hemalatha*, R.G. Thomas, K. Mahata, S. Kailas, and A.K. Gupta, Nucl. Inst. Meth. B366, 13 (2016).**
- Correlation between nuclear charge radii of Ti and reaction cross sections for $p\text{-Ti}$, ***M. Hemalatha*, N. Maladkar and S. Kailas, Phy. Rev. C, 92, 024611 (2015).**
- Nuclear Transmutation Strategies for Management of Long Lived Fission Products, S. Kailas, ***M. Hemalatha*, and A. Saxena, Pramana, 85, 517 (2015).**
- Elastic scattering of the halo nucleus ^{11}Be on ^{64}Zn , ***M. Hemalatha*, European Physical Journal, 66, 03036 (2014).**
- Double folding model analysis of elastic scattering of halo nucleus ^{11}Be from ^{64}Zn around Coulomb barrier, ***M. Hemalatha*, Pramana 82, 789 (2014).**
- Evolution of octupole collectivity in ^{221}Th , S.K. Tandel, ***M. Hemalatha*, A.Y. Deo, and S.B. Patel, R. Palit, T. Trivedi, J. Sethi, and S. Saha, D.C. Biswas and S. Mukhopadhyay, Phys. Rev. C 87, 034319 (2013).**
- A study of secondary cosmic ray flux variation during the annular eclipse of 15 January 2010 at Rameswaram, India, Ankush Bhaskara, Avadhut Purohit, ***M. Hemalatha*, Chintamani Pai, Anil Raghav, Chetan Gurada, S. Radha, Virendra Yadav, Vishal Desai, Abhishek Chitnis, Padmanabh Sarpotdar, and Anirudha Patankar, Astroparticle Physics, 35, 223 (2011).**

- Predicted weakening of the spin-orbit interaction with the increase of neutron number, **M. Hemalatha**, Y. K. Gambhir, W. Haider, and S. Kailas, **Phy. Rev. C** **79**, 057602 (2009).
- Accelerator mass spectrometry programme and related developments at the BARC-TIFR Pelletron accelerator, P. Surendran, A. Shrivastava, A.K. Gupta, R.M. Kale, J. P. Nair, **M. Hemalatha**, K. Mahata, M.L. Yadav, H. Sparrow, R.G. Thomas, P.V. Bhagwat, and S. Kailas, **Nucl. Inst. Meth. B** **267**, 1171 (2009).
- Microscopic optical model potentials for p -nucleus scattering at intermediate energies, **M. Hemalatha**, S. Kailas, W. Haider, and Y. K. Gambhir, **Phys. Rev. C** **75**, 037602 (2007).
- Development of a high-sensitive fluorescence cell for measurement of atomic isotope shifts and hyperfine structures, **M. Hemalatha**, S. Kailas, A. Venugopalan, B.N. Jagatap, and K.G. Manohar, **Nucl. Inst. Meth. A** **572**, 971 (2007).
- The study of exotic nuclei, **M. Hemalatha**, S. Kailas and Y.K. Gambhir, **Hyperfine Interactions** **162**, 133 (2005).
- Anomaly in the nuclear charge radii of Zr isotopes, **M. Hemalatha**, A. Bhagwat, A. Shrivastava, S. Kailas, and Y.K. Gambhir, **Phy. Rev. C** **70**, 044320 (2004).
- Production of neutron-deficient nuclei ^{127}Cs and ^{129}Cs by heavy-ion fusion reaction, **M. Hemalatha**, S. Kailas, K. Mahata, A. Shrivastava, K. Ramachandran, and A. Chatterjee **Nucl. Inst. Meth. A** **531**, 645 (2004).
- Beam energy calibration for the folded ion tandem accelerator, S. Santra, K. Mahata, P. Singh, C.V. Fernandes, **M. Hemalatha**, and S. Kailas, **Nucl. Inst. Meth. A** **496**, 44 (2003).

Papers in International Conferences:

- Single-particle states and isomers in ^{202}Tl and ^{203}Pb , S.G. Wahid, S.K. Tandel, A. Patel, S. Suman, P. Roy, **M. Hemalatha**, A.Y. Deo, Pragati, S. Rai, A. Sharma, S.S. Bhattacharjee, R.P. Singh, S. Muralithar, and P.C. Srivastava, Proc. DAE Symp. on Nucl. Phys 63, 228 (2018).
- Exploration of Effects of Nuclear Structure and Reaction Mechanism on the Threshold Behaviour in Nuclear Reactions with Weakly Bound Projectiles: the $^7\text{Li} + ^{74}\text{Se}$ System, U. K. Pal, V. V. Parkar, S. Santra, A. Pal, H. Kumawat, K. Ramachandran, D. Chattopadhyay, A. Kundu, C. Joshi, T.N. Nag, G. Mahanto, A. Parihari, S. De, A. Patel, **M. Hemalatha**, B. K. Nayak, Proc. DAE Symp. on Nucl. Phys 63, 660 (2018).
- Isomers and intrinsic excitations at high spin in ^{201}Tl , Poulomi Roy, S.K. Tandel, S.G. Wahid, S. Suman, A. Patel, **M. Hemalatha**, A.Y. Deo, Pragati, S. Rai, A. Sharma, S.S. Bhattacharjee, S. Muralithar, R.P. Singh, and P.C. Srivastava, Proc. DAE Symp. on Nucl. Phys 63, 238 (2018).
- Unusual behaviour of nuclear charge radii and reaction cross sections in $N=28$ region, **M. Hemalatha**, N. Maladkar and S. Kailas, Proc. International Nuclear Physics Conference (INPC2016), *Adelaide, Australia*, September 11-16, 2016.
- Prediction of reaction cross-section for $p\text{-Cr}$, **M. Hemalatha**, N. Maladkar and S. Kailas, Proc. International Conference on Nuclear Structure and Related Topics, *Dubna, Russia*, **41**, 2015.
- Nuclear Transmutation Strategies for Management of Long Lived Fission Products, S. Kailas, **M. Hemalatha**, and A. Saxena, Proc. 75 years of Nuclear Fission: Present status and future perspectives, *Mumbai, India*, **47** (2014).
- Elastic scattering of halo nucleus ^{11}Li in the vicinity of Coulomb barrier, **M. Hemalatha**, and S. Kailas, Proc. VI International Conference FUSION14, *New Delhi, India*, **6**, 28 (2014).
- Elastic scattering of the halo nucleus ^{11}Be on ^{64}Zn , **M. Hemalatha**, International Nuclear Physics Conference (INPC2013), *Firenze, Italy*, **NR76** (2013).
- Evidence of subshell gap at $N=72$ in neutron-rich nuclei, **M. Hemalatha**, Nuclear Structure with Advanced Gamma-detector Arrays (NSP13), *Padova, Italy*, (2013).

- Evolution of octupole collectivity in ^{221}Th , S.K. Tandel, **M. Hemalatha**, A.Y. Deo, S.B. Patel, R. Palit, T. Trivedi, J. Sethi, S. Saha, D.C. Biswas, S. Mukhopadhyay, International Nuclear Physics Conference (INPC2013), *Firenze, Italy*, C1 (2013).
- Design of fluorescence cell for isotope shift measurements by atomic-beam laser spectroscopy, **M. Hemalatha**, Proc. International DAE Symp Nuc. Phys., *Mumbai, India*, **58**, 978 (2013).
- Elastic scattering of halo nucleus ^7Li with near-barrier energies, **M. Hemalatha**, Proc. International DAE Symp Nuc. Phys., *Mumbai, India*, **58**, 546 (2013).

Papers in National Conferences:

- Proton-induced production cross section for therapeutic radionuclide ^{192}Ir , M. Hemalatha, D. Kelkar, K. Churi, and S. Hinge, Proc. DAE Symp. on Nucl. Phys **66**, (2022).
- Nuclear transmutation of long-lived fission fragment ^{126}Sn using protons, K. Churi and **M. Hemalatha**, Proc. DAE Symp. on Nucl. Phys **65**, 848 (2021).
- Reaction cross section for $p\text{-Fe}$, N. Maladkar, **M. Hemalatha** and S. Kewat, Proc. DAE Symp. on Nucl. Phys **64**, 567 (2019).
- Total reaction cross section for $p\text{-Sm}$ at $E_p = 65$ MeV, R. Gala, **M. Hemalatha**, Proc. DAE-BRNS Symp. on Nucl. Phys. **61**, 590 (2016).
- Cross sections of $^{79}\text{Se}(p,n)$ reaction for nuclear transmutation, **M. Hemalatha**, B.K. Nayak, S.V. Suryanarayana, G. Mahanto, A. Patel, S.G. Wahid, S. Santra, H. Naik, S.K. Tandel, D. Negi, S. Kailas, N. Maladkar, A. Saxena, Proc. DAE-BRNS Symp. on Nucl. Phys. **61**, 588 (2016).
- Charge radius of doubly magic ^{56}Ni and reaction cross section for $p\text{-Ni}$, N. Maladkar, **M. Hemalatha**, S. Kailas, Proc. DAE-BRNS Symp. on Nucl. Phys **60**, 618 (2015).
- Excitation function of (p, n) reaction on ^{67}Zn , A. Patel, **M. Hemalatha**, S. Kailas, Proc. DAE-BRNS Symp. on Nucl. Phys **60**, 500 (2015).
- ^{129}I measurement at BARC-TIFR Pelletron accelerator facility, P. Surendran, J.P.Nair, R.G. Mane, **M. Hemalatha**, M.L. Yadav, H. Sparrow, R. G. Thomas, S. Kailas, Indian Particle Accelerator Conference, (2015).
- Proton-induced reactions on Se isotopes, **M. Hemalatha**, A. Saxena, S. Kailas, Proc. DAE Symp. on Nucl. Phys **59**, 582 (2014).
- Identification of Polyatomic Anions by Accelerator based Mass Spectrometry at Pelletron-LINAC Facility, R.G. Mane, P. Surendran, **M. Hemalatha**, K. Mahata, J.P.Nair, R.M.Kale, A.K.Gupta Proc. SPARC, 2014.
- Double folding model analysis of elastic scattering of halo nucleus ^{11}Be from ^{64}Zn around Coulomb barrier, **M. Hemalatha**, Proc. National conference on nuclear physics (NCNP2013), Sambalpur University, Odisha, 30 (2013).
- Study of subshell gap around $N=70$ for neutron-rich nuclei, **M. Hemalatha**, Proc. DAE Symp. Nuc. Phys. **56**, 686 (2011).
- Study of Spin Rotation Function for Polarised Proton Incident on Zr and Sn Isotopes, **M. Hemalatha**, S. Kailas, W. Haider, and Y. K. Gambhir, Proc. DAE Symp Nuc. Phys. **54**, 270 (2009).
- Determination of $^{36}\text{Cl}/\text{Cl}$ ratio in ground water using the Accelerator Mass Spectrometry Technique, Suman Sharma, A.S. Deodhar, U. Saravana Kumar, P. Surendran, A. Shrivastava, A.K. Gupta, J.P.Nair, M.L. Yadav, **M. Hemalatha**, H. Sparrow, K. Mahata, R.G. Thomas, P. V. Bhagwat, S. Kailas, R.M. Kale, Conference Proceedings, InPAC-2009.
- Accelerator Mass Spectrometry programme at Mumbai Pelletron Accelerator Facility, P. Surendran, A. Shrivastava, A.K. Gupta, J.P.Nair, M.L. Yadav, **M. Hemalatha**, H. Sparrow, K. Mahata, R.G. Thomas, P. V. Bhagwat, S. Kailas, Suman Sharma, A.S. Deodhar, U. Saravana Kumar, R.M.Kale, International Topical Meeting on Research Application and Utilization of Accelerators, Vienna, Austria, 4-8 May 2009.

- Mass and energy dependence of the second moments of microscopic optical potentials, **M. Hemalatha**, S. Kailas, W. Haider, and Y.K. Gambhir, Proc. DAE Symp Nuc. Phys. **52**, 355 (2007).
- Microscopic optical potential for polarised proton nuclear scattering, **M. Hemalatha**, S. Kailas, W. Haider, and Y.K. Gambhir, Proc. DAE Symp Nuc. Phys. **51**, 331 (2006).
- Segmented Gas Detector for Identification of AMS Radionuclide ^{36}Cl , A. Shrivastava, P.V. Bhagwat, A.K. Gupta, **M. Hemalatha**, S. Kailas, K. Mahata, K. Ramachandran, P. Surendran, S.K. Aggarwal, D. Alamelu, Proceedings of ISMAS-2006,
- Analysing Power Angular Distribution for $p - \text{Zr}$ isotopes at $E_p = 50$ MeV, **M. Hemalatha**, S. Kailas, W. Haider, and Y.K. Gambhir, Proc. DAE Symp Nuc. Phys. **50**, 363 (2005).
- Testing of the High Sensitive Fluorescence Cell for Measurement of Atomic Isotope Shifts and Hyperfine Structures using Laser Spectroscopy, **M. Hemalatha**, S. Kailas, A. Venugopalan, B. N. Jagatap, and K. G. Manohar, Proc. Fourth DAE National Laser Symposium, **NLS-4**, 277 (2005).
- The Isotope Shift and Hyperfine Structure of $^{85,87}\text{Rb}$ Isotopes using Laser Spectroscopy, **M. Hemalatha**, P. Schumann, C. Geppert, and K. Wendt, Biennial Report, NPD, BARC/2003/P/001, (2005).
- Analysing Power Angular Distribution for $p - \text{Zr}$ isotopes at $E_p = 50$ MeV, **M. Hemalatha**, S. Kailas, W. Haider, and Y. K. Gambhir, Proc. DAE Symp Nuc. Phys. **46B**, 206 (2004).
- Anomaly in the nuclear charge radii of Zr isotopes, **M. Hemalatha**, A. Bhagwat, A. Shrivastava, S. Kailas, and Y.K. Gambhir, Proc. DAE Symp Nuc. Phys. **46B**, 306 (2003).
- Production and study of doubly magic nucleus ^{146}Gd , **M. Hemalatha**, S. Kailas, A. Shrivastava, A. Bhagwat, and Y.K. Gambhir, Proc. DAE Symp Nuc. Phys. **46B**, 46 (2003).
- Lasers in nuclear physics, B.N. Jagatap, **M. Hemalatha**, A. Marathe, Proc. DAE Symp Nuc. Phys. **46A**, 46 (2003).
- Systematic study of ground state properties of Cs isotopic chain in RMF formalism, **M. Hemalatha**, S. Kailas, A. Bhagwat, and Y.K. Gambhir, Proc. DAE Symp Nuc. Phys. **46B**, 130 (2003).
- Breakup coupling effects on elastic scattering of $^7\text{Li} + ^{90}\text{Zr}$, V. Jha, P. Shukla, B.J. Roy, A. Chatterjee, K. Ramachandran, A. Navin, K. Mahata, S. Kailas, **M. Hemalatha**, A. Shrivastava, V. Tripathi, S. Rathi, R.G. Thomas, and P.K. Sahu, Proc. DAE Symp Nuc. Phys. **46B**, 206 (2003).
- Direct reaction and fusion cross-section for $^7\text{Li} + ^{12}\text{C}$ at energies near the coulomb barrier, V.V. Parkar, S. Santra, K. Mahata, S. Kailas, K. Ramachandran, V. Tripathi, A. Chatterjee, and **M. Hemalatha**, Proc. DAE Symp Nuc. Phys. **46B**, 282 (2003).
- Gas ionization chamber for identification of ^{36}Cl , A. Shrivastava, S. Kailas, **M. Hemalatha**, and S. Rathi, Proc. DAE Symp Nuc. Phys. **46B**, 546 (2003).
- Status of AMS program at Mumbai Pelletron Accelerator facility, S. Kailas, A. Shrivastava, K. Mahata, P.V. Bhagwat, A.K. Gupta, P. Surendran, **M. Hemalatha**, and K. Ramachandran, Indian Particle Accelerator Conference (INPAC) 692 (2003).
- Development of a high sensitive fluorescence cell for measurement of atomic isotope shifts and hyperfine structures, **M. Hemalatha**, K. Mahata, V.M. Datar, S. Kailas, A. Venugopalan, S. Pradhan, B.N. Jagatap, K.G. Manohar, N. Venkataramani, Proc. DAE Symp Nuc. Phys. **45B**, 472 (2002).
- Isotope shifts and isotonic systematics of nuclear radii, **M. Hemalatha**, S. Kailas, A. Bhagwat, and Y.K. Gambhir, Proc. DAE Symp Nuc. Phys. **45B**, 264 (2002).
- Production rates of ^{127}Cs and ^{129}Cs , **M. Hemalatha**, S. Kailas, K. Mahata, A. Shrivastava, K. Ramachandran, and A. Chatterjee, Proc. DAE Symp Nuc. Phys. **45B**, 252 (2002).
- Pre-Fission Charged Particle Multiplicities for $^{10}\text{B} + ^{232}\text{Th}$, K. Ramachandran, A. Chatterjee, A. Navin, K. Mahata, Vandana Tripathi, **M. Hemalatha**, S. Kailas, R.G. Thomas, L. M. Pant, and A. Saxena, Proc. DAE Symp Nuc. Phys. **44B**, 162 (2001).
- A calibration experiment for FOTIA, S. Santra, K. Mahata, P. Singh, S. Kailas, and **M. Hemalatha**, International Conference on Heavy Ion Accelerator Technology (2001).

Teaching Theory courses:

- o Teaching Theory courses (M.Sc. students at Department of Physics, University of Mumbai): Nuclear Physics (core), Nuclear Reactions, and Experimental Techniques in Nuclear Physics.
- o Teaching Ph.D. Coursework (Ph.D. students at Department of Physics, University of Mumbai): Experimental Physics.
- o Taught Theory courses (Integrated M. Sc. students at UM-DAE CEBS, Mumbai): Nuclear Physics, Optics, Modern Physics, Radiation Science, and Electrodynamics.

Laboratory Development and Teaching laboratory courses:

- o **Advanced Nuclear Physics Laboratory development at Department of Physics, University of Mumbai:** Initiated resurrecting and developed the Nuclear Physics laboratory at Department of Physics, University of Mumbai that required a revamping. New equipment procured and several more are planned. Teaching Laboratory courses to Department M.Sc. students.
- o **General, Nuclear and Laser Physics Laboratory development at UM-DAE Centre for Excellence in Basic Sciences:** Played a primary role in the development of General Physics and Nuclear Physics and Laser Spectroscopy laboratories, planned innovative experiments, procured equipment, designing experiments, instructing students, took the lead for procuring x-ray, alpha, beta and gamma-ray sources and made arrangements for their storage and safety. Laser-based experiments using external tunable diode lasers.

Participation in infrastructure tasks and academic administration

- o Ph.D. Cell and Ph.D. Course Coordinator
- o Reviewer for several International and National peer reviewed journals and project proposals
- o Co-Convenor of “Workshop on 150 years of Periodic Table of elements”
- o Radiological safety officer (RSO) approved by Atomic Energy Regulatory Board
- o Member of several Departmental Committees
- o Member of several interview/selection committees