Department of Physics

Faculty of Science

Information Brochure 2023-24

THE MAHARAJA SAYAJIRAO UNIVERSITY OF BARODA
VADODARA-390002, GUJARAT, INDIA

THE MAHARAJA SAYAJIRAO UNIVERSITY OF BARODA

सत्यं शिवं सुन्दरम्

महाराजा सयाजीराव विश्वविद्यालय गीत

अमे वडोदराना विद्यापीठना सपना सारवनारा
अमे ज्योत जलावी सृष्टी नवली सहसा सर्जनहारा.

अमे गगमकुसुम कर धरनारा
अमे मगन मगन थई फरनारा
अगन बाथ अमे भरनारा
अमे दैन्यतिमिरने हरनारा.

श्री सयाजी विद्यापीठना ज्ञानदीपने धरनारा
सत्यं शिवं सुन्दरम् नो मंत्र अनंतर भणनारा.

H.H. Maharaja Sayajirao Gaekwad-III

MISSION STATEMENT

Vision and mission as perceived by H. H. Maharaja Sayajirao Gaekwad-III

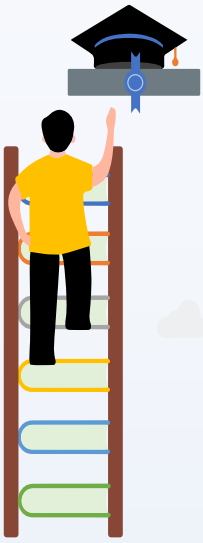
"The progress of a nation requires that its people should be educated. Knowledge is a necessity of man. It instills in him a desire to question and to investigate, which leads him on the path of progress.

Education, in the broadest sense, must be spread everywhere. Progress can only be achieved by the spread of education. Cooperation is necessary to achieve any worthy end and this readiness to cooperate will not be found in people if they are noteducated."

Department of Physics

"I would like to tell the young men and women before me not to lose hope and courage. Success can only come to you by courageous devotion to the task lying in front of you. I am the master of my failure. If I never fail how will I ever learn? Ask the right questions, and nature will open the doors to her secrets."

C. V. Raman



VISION:

Achieving leadership in physics at the national and international levels, actively participating in the community institutions for far reaching ramifications on the society and mankind at large in tune with the vision of the Maharaja Sayajirao University of Baroda, Vadodara through an excellent and reputable study programs, research and innovation.

MISSION:

- **To establish the latest cutting-edge facilities for ground breaking research in the field of physical sciences by the development of knowledge, skill and aptitude of the stakeholders.**
- **To facilitate effective collaborations, communication and dissemination of knowledge into various scientific and social strata employing different media by enhancing the curriculum and its flexibility for better career advancements and future prospects.**
- **To nurture the scientific skills and social responsibility in students through inculcating vast potential of the subject and spreading its implications in enriching society and mankind.**

From the Desk of Head, Department of Physics

Welcome to the Department of Physics, The Maharaja Sayajirao University of Baroda, located in the cultural capital of Gujarat, Vadodara. Since 1949, the seven decades of our department have been a witness to continual growth of expertise and competence in fundamental Physics. It is one of the first departments established under Faculty of Science with programs offered in diverse specializations of Physics such as, condensed matter physics, nuclear physics, atomic physics and spectroscopy and electronics. To cater the need of time we also offer several electives on recent developments in science in general and physics in particular.

This is possible due to excellent teaching faculties who are involved in a number of research projects with total grants to the tune of 408 lakh under national and international collaborations sponsored by major funding agencies such as, DST, SERB, UGC, MOES, DAE- BRNS, DRDO etc. The Department had been awarded University Grants Commission's Department Research Support (DRS) phases I, II & III, and COSIST programs and the Department of Science & Technology had awarded DST-FIST. The output is evident in the high-impact research carried out by the faculties and research scholars with 281 publications (last five years) in reputed peer reviewed journals indicating towards the impact the department has on the scientific community. Several faculty members serve on the editorial boards of national and international journals, review technical articles for journals on a regular basis, and organize international symposia and conferences.

The faculties of this department are highly regarded individuals in their fields, recognized by several awards and distinctions making them the source of motivation and inspiration to the young and curious minds who get admitted in this department. Over the years, the focus and approach of the department has evolved from hard-core physics to more inclusive and cutting-edge interdisciplinary physics such as biophysics, chemical physics etc. keeping the stakeholders at the center of the process and enriching them with knowledge and skills required in the modern scientific explorations. Such reputed, diverse and vibrant atmosphere attracts several applications from students across the country for UG, PG and PhD programs. During an academic year, the department hosts and facilitates 150 UG, 55 PG and significant number of Ph.D. scholars (sponsored by various funding agencies).

With this, I invite students to be a part of our interactive and vibrant department; to gain knowledge and skills in Physics which would make them ready for higher academic pursuits and industrial R&D. The prospectus provides essential information about the department, about working here, and about the various academic programs that we have. If you need any additional information or support, please do not hesitate to contact me or any of my colleagues in the department. You can also contact, through departmental email (head- phy@msubaroda.ac.in), to hear about other matters of importance, such as information relating to university or departmental policies and procedures.

Best Wishes,

(Prof. P. K. Jha)

HISTORY AND CURRENT STATUS

Year of Establishment: 1949
Legacy since: 1881
First Head of Department (Uni.): Prof. D.V. Gogate
First Head (Before 1949): Prince S. G. Burrow

Head: Prof. P. K. Jha

Faculties

Professors:		
Prof. P. K. Mehta	Prof. P. K. Jha	Prof. M. Srinivas
Associate Professors:		
Dr. K. R. Jotania	Dr. D. G. Rathod	Dr. P. H. Soni
Assistant Professors:		
Dr. M. Sarkar	Dr. B. P. Shah	Dr. K. N. Vyas
Dr. D. Bagchi	Dr. R. Makwana	Dr. R. D. Chauhan
Dr. K. H. Chaudhari	Dr. Alpa Dashora	

PROGRAMS

UG: B.Sc. (Hons. Physics) PG: M.Sc. Physics
Ph. D. (Physics)

Specialization (PG- SEM III and IV):

- ➔Condensed Matter Physics
- ➔Electronics & Communications
- ➔Nuclear Physics
- ➔Atomic and Molecular Spectroscopy

Electives (PG-SEM III):

- ➔Astrophysics and Cosmology
- ➔Experimental Techniques
- ➔Advanced Theoretical Physics

Electives (PG-SEM IV):

- ➔Experimental Techniques
- ➔Nanoscience and Biomaterials

Electives/Foundation (UG):

- ➔Biophysics
- ➔Nanoscience
- ➔Bio Medical physics
- ➔Medical Physics
- ➔Astrophysics

Support to:

- ➔UG Physiotherapy
- ➔PG Radiology
- ➔IGNOU

Introduction and Highlights of the Department:

The department of Physics at the Maharaja Sayajirao University of Baroda was established in 1949. Department is running U.G., P.G. and Ph.D. programs. In M.Sc., students are offered Condensed Matter Physics, Electronics and Communication, Nuclear Physics and Molecular Spectroscopy as specialization. The department is also equipped with two of the oldest and famous observatories:

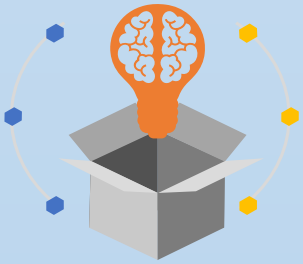
(i) Astronomical Observatory and (ii) Meteorological observatory.

A sizable no. of students is being selected for higher studies in premier institutions of India as well as seeking admissions abroad. All members of teaching staff are equipped with Desktop Computer with net facility at their desk and research labs have advanced equipment and work stations of higher configured computers for advanced theoretical work. The Department had been awarded University Grants Commission's Department Research Support (DRS) phases I, II & III, and COSIST programs and the Department of Science & Technology had awarded DST-FIST program in Condensed Matter Physics as thrust research area. Subsequently, University Grants Commission, New Delhi has awarded DSA Phase-I in the thrust areas of Condensed Matter Physics and Nuclear Physics. Various funding agencies have granted over 3.00 cores for supporting ongoing research activities of the individual faculty members, while department has obtained approximately Rs.6 Crores during last five years. The research interests of the department cover experimental and theoretical Condensed Matter Physics, Material Science, Experimental Nuclear Physics, Spectroscopy, Theoretical Particle Physics and Astrophysics. The research laboratories are well equipped by TDPAC Set up, Mossbauer Spectrometer Set up, Thin Film Coating Unit, Conductivity and Hall-Effect, UV-VIS-NIR Spectrophotometer, Impedance Gain Phase Analyzer, X-ray Diffractometer, Closed Cycle Cryogenic systems (two), Keithly Electrometer, Keithly programmable constant current source and Keithley Programmable Nano Voltmeter.

Current research activities of the department:

- The Department of Physics has a glorious history of nine decades and was established as one of the earliest Department under the Faculty of science. The Department is recognized for many significant contributions to our understanding of experimental as well as theoretical physics. The main focus of the research activities of the theoretical and experimental Physics.

- Theoretical condensed matter Physics: Model calculations on transport properties and ground state properties of graphene, ab initio calculations on transport through atomic chains and wire optical properties of small cluster national & international conferences. The first principles calculations based on density functional theory is used to investigate the electronic, mechanical, optical and vibrational properties of variety of materials both at bulk and nanoscale levels including metal clusters, graphene and graphene like materials, semiconductor wires etc. The pressure or strain dependent studies on materials are interpreted in terms of their applications in nanodevices and seismic waves. These approaches are also being used to understand the interaction between the inorganic and biomolecules for their perspective uses in nano-electronic devices



- Nuclear Physics: The experimental Nuclear Physics activities are being carried out by using national facilities such as Pelletron of TIFR/BARC, Mumbai and IUAC, New Delhi and Variable Energy Cyclotron (VEC), Kolkata. (a) The study of fast neutron induced fission and reaction cross-sections for advanced reactors and Accelerator Driven subcritical systems (ADSS) applications (b) Effect of elastic scattering break up / transfer and reaction cross section with heavy nuclei (c) Study of break up / transfer fusion cross section and elastic scattering cross section with weakly bound stableprojectiles (d) Fission fragments angular and mass distributions of various systems in the medium and heavy-nuclei.

- Experimental Condensed Matter Physics: work on (a) Crystal growth, Thin film and their characterization (b) Electrical, optical and spectroscopic properties of polymers and their composites, (c) Li-Ion polymer nano composite electrolytes, Na-Ion batteries and their radiation effect etc. (d) Photoluminescence studies of nanomaterials for the application of making LEDs. Rare earth doped tungstate nanomaterials, Perovskite materials were explored for solid state lighting application. Thermoluminescence studies of materials in the application for Radiation Dosimetry. (e) Study of conjugated polymers for low cost electronic and photovoltaic applications (f) Effect of SHI irradiation on polymer nano composites for EMI shielding and gas sources applications and (g) Effect of substitution on multifunctional oxide systems. (h) Research is also being conducted in biomimetics and dynamics of soft materials such as polymers and gels when they are away from equilibrium.

For further information please contact:
head- phy@msubaroda.ac.in

Individual Research Projects (2016-21)

Sr. No.	Principle Investigator, Funding Agency, Title of Project	Grant Allocated (In Lakhs)
1.	Prof. P. K. Jha, DST, Machine learning based Ab initio and experimental design of sustainable heterogeneous catalyst for CO_2 reduction	12.5
2.	Prof. P. K. Jha, SERB (DST), New Delhi Bio-conjugated Nanostrucred Materials: Electronic and VibrationalProperties using First Principles Methods	35.2
3.	Prof. P. K. Jha, UGC Energy Landscape and Pressure Induced Phase transition and Amophisation in transition metal dioxides using ab-initio calculations	11.2
4.	Prof. P K Jha, MOES Kachchh of Integrated Project on Active Fault Mapping in Kachchh Basin (A First Principles Investigation to the Seismic Activity of Faults)	25.50
5.	Prof. P K. Jha, DST (Indo Poland) Development of materials for the large enhancement in the thermoelectric properties using efficient computational approach	19.21
6.	Prof. P K. Jha, DST (Indo Srilanka) Electronic and Photovoltaic properties of Two-Dimensional HybridOrganicand Inorganic Perovskites	21.00
7.	Prof. P K. Jha, DST (SERB-CRG) Exploring Boron Based nanomaterials for Compact and Highly Sensitive Neutron Detectors by Band Engineering: A Combined Density Functional theory and Experimental Approach	28.16
8.	Prof. P K. Jha, UGC-DAE CSR (Indore Centre) Study of enhancement of p-type conductivity in delafossite typeoxides using photoemission spectroscopy (PES) and DFT	10.26
9.	Prof. P K. Jha, UGC-DAE CSR (Kolkata Centre) Ion irradiation-induced effects on 2D Transition metal dichalcogenides nanostructured materials: A combined experimentaland theoretical studies	13.59
10.	Dr. Debjani Bagchi, GSBTM Using Lignocellulosic Biomass for Microalgal growth for producinguseful productssuch as Chlorophyll and Carotenoids	18.3
11.	Dr. Debjani Bagchi, SERB Out of equilibrium dynamics in biopolymers near glass transition	21.2
12.	Dr. R.J. Makwana, UGC, Generation of nuclear data for reactor application	7.4
13.	Dr. R.J. Makwana, Defeance Lab Jodhpur Simulation for Identification of shielding materials againstHigh Energy Particle	7.4
14.	Dr. R.J. Makwana, Defeance Lab Jodhpur Simulation and development of radiation shielding material	9.9
15.	Dr. Alpa Dashora, UGC-Start-up Research Grant	6.0
16.	Dr. Alpa Dashora, DST INSPIRE Faculty	35.0
	Total	281.82

Research Output

Number of Publications (2016-2022): 348

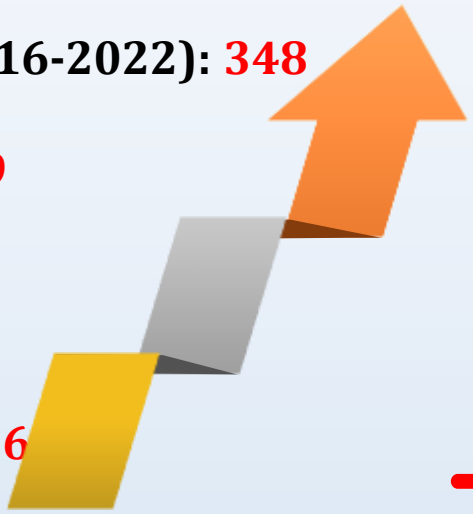
Range of Impact factor: 0-19

Average Impact Factor: 2.11

H-index of Department: 42

i10 index of Department: 256

Total Citation: 10052 (As per Scopus)



Journals: Nature Communications, Scientific Reports, Applied Physics Letters, Physical Review, Physics Letters, Journal of Applied Physics, Journal of Physics: Condensed Matter, Journal of Molecular Liquids, Physica Status Solidi (RRL, a &b), RSC Advances, ACS Applied Nanomaterials, ACS Applied Materials and Interfaces, Polymer, Applied Surface Science, Surface Science, International Journal of Hydrogen Energy, Mat. Chemistry and Physics, Journal of Luminescence, Journal of Fluorescence, ChemistrySelect, Rare Metals, Journal of Radiation Physics and Chemistry.

Citations and h-index for each faculty

Name	Scopus		Google Scholar	
	Citation	h- index	Citation	h- index
Prof. P.K. Mehta	144	6	....	.....
Prof. P.K. Jha	5944	36	5944	38
Prof. M. Srinivas	79	6	95	5
Dr. K. R. Jotania	394	13	....	....
Dr. P.H. Soni	194	7	85	5
Dr. M Sarkar	82	5	109	5
Dr. Debjani Bagchi	286	9	373	10
Dr. R. J. Makwana	992	17	826	12
Dr. Alpa Dashora	1165	16	1576	18

Conferences and Seminars

Invited talks by the faculties: 25 (I) and 27(N)

Session chaired by the faculties: 10(I) and 20(N)

Organized by the Department:12

Research papers with highest Impact factor from Department of Physics (Year 2016 onwards)

Impact Factor	Title	Authors	Journal	Year
20.83	Recent advances in electrolytes for room-temperature sodium-sulfur batteries: A review	**Kanchan D.K.** et al.	Energy Storage Materials, 31, 352-372	2020
19.16	Single molecule kinetics uncover roles for *E. coli* RecQ DNA helicase domains and interaction with SSB	**Debjani Bagchi** et al.	Nucleic acids research, 46, 8500-8515	2018
19.16	Mechanistic characterization of the DEAD-box RNA helicase Ded1 from yeast as revealed by a novel technique using single-molecule magnetic tweezers	**Debjani Bagchi** et al.	Nucleic acids research, 47, 3699-3710	2019
16.79	Thermal transport properties of boron nitride based materials: A review	**Prafulla K. Jha** et al.	Renewable and Sustainable Energy Reviews, 120, 109622	2020
14.22	A new flatland buddy as toxic gas scavenger: A first principles study	**Prafulla K. Jha** et al.	Journal of hazardous materials, 351, 337-345	2018
10.38	Electrophoretically Deposited $MoSe_2/WSe_2$ Heterojunction from Ultrasonically Exfoliated Nanocrystalsfor Enhanced Electrochemical Photo response	**Prafulla K. Jha** et al.	ACS applied materials& interfaces, 11, 4093-4102.	2019
11.30	Understanding the synergistic effect of Co-loading and B-doping in g-C_3N_4 for enhanced photocatalytic activity for overall solar water splitting	**Alpa Dashora** et al.	Carbon, 178, 666-677	2021
10.05	Flexible Self-Powered Electrochemical Photodetector Functionalized by Multilayered Tantalum Diselenide Nanocrystals	**Prafulla K. Jha** et al.	Advanced Optical Materials, 9, 2100993.	2021
8.198	Solution-Processed Uniform $MoSe_2$-WSe_2 Heterojunction Thin Film on Silicon Substrate for Superior and Tunable Photodetection	**Prafulla K. Jha** et al.	ACS Sustainable Chemistry & Engineering, 8, 4809-4817	2020
8.198	Humidity Sensor Based on Two-Dimensional $SnSe_2$/MWCNT Nanohybrids for the omline Monitoring of Human Reapiration anda Touchless Positioning Interface	**Prafulla K. Jha** et al.	ACS Sustainable Chemistry & Engineering, 8, 12595-12602.	2020

Research papers with highest citations from Department of Physics (Year 2016 onwards)

Citation	Title	Authors	Journal	Year
133	Dielectric relaxation, complex impedance and modulus spectroscopic studies of mix phase rod like cobalt sulfide nanoparticles	**Kanchan D.K.** et al	Mater. Res. Bull, 93, 63-73	2017
90	Progress and prospects of sodium-sulfur batteries: A review	**Kanchan D.K.** et al.	Solid State Ionics 312, 8-16.	2017
69	Two-dimensional boron: lightest catalyst for hydrogen and oxygen evolution reaction	**Prafulla K. Jha** et al.	Applied Physics Letters, 109, 053903	2016
68	A new flatland buddy as toxic gas scavenger: A first principles study	**Prafulla K. Jha** et al.	Journal of hazardous materials, 35, 337-345	2018
66	Paper-Based Flexible Photodetector Functionalized by WSe_2 Nanodots	**Prafulla K. Jha** et al.	ACS Applied Nano Materials, 2, 2758-2766	2019
48	Recent advances in electrolytes for room-temperature sodium-sulfur batteries: A review	**Kanchan D.K.** et al	Energy Storage Materials, 31, 352-372	2020
46	A comparative study of hydrogen evolution reaction on pseudo-monolayer WS_2 and PtS_2: Insights based on the density functional theory	**Prafulla K. Jha** et al.	Catalysis Science & Technology, 7, 687-692	2017
45	Effect of l-threonine on growth and properties of ammonium dihydrogen phosphate crystal	**Kanchan D.K.** et al.	Arabian Journal of Chemistry, 13, 1532-1550.	2020
42	Thermal transport properties of boron nitride based materials: A review	**Prafulla K. Jha** et al.	Renewable and Sustainable Energy Reviews, 120, 109622.	2020
36	Influence of alloy engineering on structural and photo detection properties of $Sb_xSn_{1-x}Se_2$ ternaryalloys	**Prafulla K. Jha** et al.	Applied Surface Science, 462, 856-861	2018

Awards/Recognition by Faculty

Prof. P. K. Jha

- ➔ Awarded PROM Fellowship of Polish National Agency fir Academic Exchange (2022) [10-5-2022 to 16-05-2022]
- ➔ Invites as visiting professor by Bialystok Universityof Technology, Bialystok, Poland {2022} [11-05-2022 to 29-05-2022]
- ➔ Admitted as fellow to the Royal Society of Chemistry (2020)
- ➔ Figured among the top two percent scientists and academician in a global list for the years 2019 and 2020 and in Life time category compiled by the researchers from Stanford University and Published in PLOS Biology
- ➔ Awarded INSA teacher award (2018) by Indian National Science Academy
- ➔ Awarded ICTP regular associateship (2010-2015). Awarded TWAS-UNESCO associateship (2009-2013)
- ➔ Awarded UGC-Post Doctoral Research Award by UGC, New Delhi.(2012-2014)
- ➔ Appointed Associate Editor of the Journal "Nanoscience and Nanotechnology Letters (2010-2013)"
- ➔ Member editorial Board: Solid State Phenomena, J of Nano research, Advance Materials Research, American Journal of Condensed Matter Physics-continue

Dr. Alpa Dashora

- ➔ INSPIRE Faculty Award by DST
- ➔ Young Scientist Award by DST under EXCELLENT category

Dr. Rajnikant Makwana

- ➔ Spanish AGATA Postdoctoral Fellowship

Awards/Recognition by students: 2016 onwards

- ➔ DST Inspire Fellowship to 5 students
- ➔ CSIR Fellowship to 2 students
- ➔ Research Associate Fellowship to 2 students
- ➔ SHODH Fellowship to 8 students
- ➔ UGC-BSR Fellowship to 3 students
- ➔ University research Fellowship to 2 students
- ➔ Post-Doctoral Fellowship to 8 students (at Different Universities)
- ➔ Best Poster Award to 7 students at reputed conferences such asDAE-SSPS, DAE-CCS and etc.
- ➔ Best oral presentation Award to 2 students at reputed conferencessuch as DAE-CCS and etc.
- ➔ Student travel Award by DST to 2 students


66th DAE Solid State Physics Symposium

Organized by: Bhabha Atomic research centre, Mumbai

Sponsored by: Board of research in nuclear sciences (BRNS)

Department of Atomic Energy, Government of India

This is to certify that

Bhautik R. Dhori

is conferred BEST POSTER AWARD

in 66th DAE Solid State Physics Symposium held at Birla Institute of Technology Mesra, Ranchi, during 18-22 December 2022

Ajay K. Mishra, Scientific Secretary, DAE SSPS 2022

Mohit Tyagi, Scientific Secretary, DAE SSPS 2022

Dinesh Udupa, Convener, DAE SSPS 2022

Date: 22 Dec 2022


DST/INT/JSPS/14th HOPE Meeting/2022

January 09, 2022

To,

Dr. Darshkumar Purushottam Chodvadiya,
Physical Sciences,
M.S. University of Baroda,

Subject: Nomination of Indian students for participation in 14th HOPE Meeting to be organized by Japan Society for the Promotion of Science (JSPS) in Tokyo, Japan during 27th February – 3rd March 2022.

Research collaborations

- Our faculty members are pursuing collaborative researchwith scientists from various departments and institutes.

In MSU

- Department of Chemistry (FOS)
- Department of Geology
- Department of Applied Physics (FOTE)
- Department of Applied Chemistry (FOTE)
- Department of Microbiology.

National

- BARC-Mumbai
- CSIR-CMCRI-Bhavnagar
- RRCAT-Indore
- CSR-UGC-Indore and Kolkata
- PDEU-Gandhinagar
- Nirma University Ahmedabad
- GITAM-Hydrabad.

International

- Warsaw University of technology (Poland)
- University of Sri Jayawardenepura (SriLanka)
- Southeast University (China)
- Uppsala University (Sweden)
- Beijing JiaoTong University (China)
- National University of Science and Technology "MISiS“,

Russia

- University of Putra Malaysia
- National Research Council of Iltly.

China, Poland and Malaysia visit of the professor for research work

Prof. Florian Marquardt (Max planck) and Prof. K. J. Kurzydlowski (WTU, Poland), Dr. M. L. C. Attygyalle (University of Sri Jayewardenepura, Sri-Lanka) and Prof. Rajeev Ahuja (Uppsala University, Sweden) visited and delivered talk at department of physics.

Equipment Details

SR. No.	Name of the Equipment	Make Model&Year of Purchase	Under Supervision	Type of measurements or useofthis equipment
1.	Impedance /Gain Phase Analyzer1260-Solarfrom	1260 A 2003	MRL Lab HOD	Impedance measurement
2.	2182 Nanovoltmeter- Keithly220E programmable current	2182 2003	MRL Lab HOD	Conductivity measurement
3.	FTIR Spectrophotometer. NB-100 H.S 9027-30	Source 1995	MRL Lab HOD	Vibrational spectrum measurement
4.	Electromagnet.	EM-150 1995	SSP lab HOD	Magnetic field generation
5.	Rotary Vacuum Pump, withsingle phase motor.	ED-12 1999	SSP lab HOD	Vacuum generation
6.	Digital Thickness Monitor.	DTM-101 1999	MRL Lab HOD	Thin film thickness measuremen t
7.	200 MHz Analog Oscilloscopewith accessories.	21750 2002	MRL Lab HOD	Wave form recording
8.	Polymer film making Machinewith accessories. S. S. Die with0.1, 0.2, 0.5 & temperature facility	2008	MRL Lab HOD	Polymer film preparation
9.	Differential Thermal Calorimeter (DSC)	DCS/6220 2008	MRL Lab HOD	Thermal studies & Phasechange measurement
10.	Vacuum Pumping system	VS-75 2010	MRL Lab HOD	Vacuum generation
11.	High Quality Spin coater(Model)	Deltaspin-I 2013	NRL Lab HOD	Thin film preparation
12.	Kithley Electrometer (Programmably)	D-82110 2006	HOD	dc conductivity measurement

Equipment details

SR. No.	Name of the Equipment	Make Model& Year of Purchase	Under Supervision	Type of measurements oruse of this equipment
1.	LCR Meter (Agilent)	2006	HOD	Capacitance measurement/ Impedance/Phase angle & lessmeasurements
2.	Scanning Probe Microscope (AFM)	Solver next 2011	HOD	Nanoscopic Surface Topography
3.	High Performance Computer Cluster	HP 56500 w/o Fan Guchassis code-61467 2014	HOD	Fast computation with hugememorycapacity & server
4.	High Performance Computer Cluster	80 cores 2015	PKJ	Fast computation and hugememorycapacity & server
5.	Mossbauer Spectrome ter	2002	HOD	Nuclear resonance spectrometer
6.	Shimadzu X-ray Diffractomet er		MRL Lab	X-ray Structure measurement
7.	He-closed Cycle Refrigerator for Mossbauer spectroscopy	AB 5406	MRL	Very low temp. measurement upto liquid He temp. 4 K
8.	A.C. Susceptibility	2009	MRL Lab	A.C.suceptibilty of the sample
9.	DTA-TGA		HOD	Simultaneous termal anygravimetric analysis
10.	UV-Vis-spectrofluorometer		HOD	UV-visible and Photo luminescence study
11.	HPGe Spectrometer		HOD	High resolution detector &nuclearspectrometer
12.	Smart lab with Digital projector, Laptop, Internet and Wi-Fi facility, Smart White board forteaching and Seminars.			

Major Equipment and Infrastructure

Impedance /Gain Phase Analyzer 1260 - Solartron , Approx. Rs. 18 Lakhs
1260 A Purchased in 2003

- Electrochemical Measurements-Impedance, Dielectric, Modulus, Loss, Phase etc Frequency 2.5 micro to 32 mega Hz.

1. Atomic Force Microscope (AFM) — Solver next 2011
2. Programmable Constant Current Source — Keithley-220
3. Programmable Nano Volt meter — Keithley -2182
4. Electrometer Model 6514 — Keithley– Model 6514
5. LCR Meter 20 Hz to 2 MHz — Agilent E4980 A
6. He-closed Cycle Refrigerator f or Mossbar spectroscopy AB 5406 (2)
7. Mossbauer Spectrometer Nucleonix (Co-57 source) — Room temp to Liq. Helium
8. Spin Coating Machine, Polymer thin film making machine, Single Pan Micro balance

High Performance Computing Cluster Lab

Materials Research Lab and Thin Film Unit

Seminar Cum Class Room

Telescope

Seminar cum Staff room

Placements and career

- **Career Options:** Civil Services, Government Research Organisations like BARC, ISRO, PRL Science Research institute, Energy industry, University and School Teaching.
- **Academic Options:** Masters in Physics, Applied Physics, Computational Physics, Electronics, Medical Physics, Radiological physics, Biophysics, Geophysics, Nuclear physics, Bioinformatics, instrumentation, Data Science etc. Our students make it to institutes of repute such as IITs, IISER, SN Bose, IISc, PRL Ahmedabad, WTU Poland and European university etc
- **Placements:** Major recruiters for our students include S G Analytics, and another various electronics industry.

Library Resources

- **Department Library:** Library consists of around 400 books for UG & PG teachings. Books are used both by students and teachers. Majority of books are acquired from donations by retired teachers and ex-students. There is book grant earmarked for Department atcentral library.
- Internet connectivity to all teachers and research students. Limited internet facility to PG students. Most of research papers from department are submitted electronically for publication.
- Many of the Physics research journals such as Nature group, APS, AIP, IOP, Elsevier etc. can be accessed and research papers can be downloaded through central library (INFLIBNET).

Extension Activities

- **Meteorological Observatory:** One of the oldest meteorological observatories in India. Theobservatory consists of hundred years of record on maximum & minimum temperature, rainfall, wind direction & speed, atmospheric pressure etc. The data is used by various government offices, departments of science faculty, research institutions and schools.

Astronomical Observatory: A gift from the H.H. late Sir Sayajirao Gaekwad. It houses an 8-inch refractor telescope. The observatory has been visited by several well-known scientists. It organizes shows on important astronomical events for general public and school children.

- **Physical Society: Students and teachers are members of society. It organizes lectures by eminent personalities, knowledge-based quiz competitions, cultural programs and sport activities for students.**
- **The Physical Society also plan a tour every year for the students of the department which include scientific visit to different research institutes like Plasma Research Laboratory (PRL) and Institute for Plasma Research (IPR) to develop interest towards research.**
- **The Physical Society celebrate Science week on the occasion of National Science Day (28th Feb) every year in which scientific activities like poster making, Rangoli making, Speech, Debate, Scientific Model Exhibition related to subject are involved to give students and encouragement towards subject.**


THE PHYSICAL SOCIETY


ANNUAL FAREWELL 2K22
PHYSICAL SOCIETY
FUSION - 2022
of Physics, Faculty of Science
Sayajirao University, Vadodara

- **IPA and IAPT activities:** **Lectures, experimental demonstrations and examinations to test physics knowledge are organized regularly.**
  - **Teachers deliver talks on research related subjects at science center, conferences and schools.**

Science Open House in Physics

Medicinal tree plantation on 5th Sept. 2011

Urja Yatra hosted by Faculty of Science 18th march 2011.

Presentation on Indian scientist ancient and modern on 2nd August 2011

Distinguished Alumni of Physics Department,Faculty of Science

Prof. Venkatraman Ramakrishnan,
MRC Laboratory of Molecular Biology, Cambridge University, has been awarded 2009 Nobel Prizefor his pioneering work in Chemistry for describing the structure of ribosomes, the molecules that translate the code of DNA into active proteins in the body.

Shri. Sam Pitroda
(PadmaBhushan-2009), Chairman, National Knowledge Commission and former Scientific Advisor to Prime Minister, Government of India, is well known, inventor, entrepreneur and policymaker.

Prof. A.K. Roychaudhuri,
Ex-Director, S.N. Bose National Centre for Basic Sciences, Kolkata. Shanti Swarup Bhatnagar awardee

Dr. Sudhir Trivedi

Consultant, NASA & Director, Brim RoseCorporation

Prof. V.P.N Nampoori,

Director, International School of Photonics, CUSAT, Cohin.

Prof. Sandip Pakwasa,

Well known Particle Physicist, University of Hawaii, USA.

Prof. Sumati Rao,

HRI,Allahabad, has important contributions in high energy theory and phenomenology as well as in condensed- matter physics; some of her papers have been cited more than 200 times.

ADMISSION PROCEDURE

The application form is to be filled online only. A student willing to apply for more than one MSc Program should submit separate application for each and **the application form fee in such cases will have to be paid separately for each course/program.** The students who have applied and fulfill the criteria of **minimum qualifications for eligibility** can appear in the entrance examination. **A written Entrance Test will be conducted for deciding admission to each program. The admissions will be strictly based on the merit of marks obtained in written Entrance Test.**

MSc. Previous exam on 26/06/2023.

INTAKE CAPACITY: 65 SEATS

ELIGIBILITY CRITERIA

The admission is based on the merit of entrance test only. To appear in **entrance test**, following **eligibility criteria** is to be fulfilled:

1. A student with B. Sc. or an equivalent degree (10+2+3 pattern of education) in the relevant subject from a university in any state or Union Territory of India or a global University/ Education Institution recognized by The Maharaja Sayajirao University of Baroda is eligible. The minimum marks/ grade points in qualifying examination shall be as follows:

- **For general category** candidates 50% or equivalent grade points
- **For SC/ST candidates** Must have passed qualifying examination.
- **For SEBC candidates** 45% or equivalent grade points for applicants from Gujarat and 50% or equivalent grade points for applicants from other states and Union Territories in India.

2. Candidates who have **appeared for final year of the qualifying examination** may also apply and appear in the Entrance Test. However, their admission will be confirmed only on the submitting original marksheet of the qualifying examination and fulfillment of eligibility requirement, at the time of Admission.

CRITERIA FOR CASTE-WISE RESERVATION AND OTHER QUOTA

Government of Gujarat rules for the reservation quota will be applied: SC: 7%, ST: 15%, SEBC: 27%, General: 51%. All original certificates should be produced at the time of document verification and admission.

If any relevant certificate is not produced at the time of admission, the student will NOT be considered for particular reservation category.

A student, irrespective of her/his reservation category, for admission, will be first considered for GENERAL category.

(a) The SC and ST students of other than the Gujarat state should produce a certificate from competent authority of Government of Gujarat if their original certificates DONOT indicate that their caste/Tribe is recognized under such category in Gujarat also.

(b) The SEBC category candidates are required to produce a valid non creamy layer certificate from competent authority.

(c) There will be 10 % supernumerary seat (additional seats over and above the total number of seats) reservation of the total seats for Economically Weaker Sections (EWS). Within this 10% quota, 33% seats shall be further sub-reserved for female students belonging to the same Economically Weaker Sections.

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- The SEBC category candidates are required to produce a valid non creamy layer certificate from competent authority.
- There will be 10 % supernumerary seat (additional seats over and above the total number of seats) reservation of the total seats for **Economically Weaker Sections (EWS).** Within this 10% quota, 33% seats shall be further sub-reserved for female students belonging to the same Economically Weaker Sections.

- Reservation for physically disabled students: 5% seats of the total seats (to be included under each different category with in the limit of total reservation under a particular reservation category like SC/ST/SEBC/GEN) are reserved for the persons with benchmark disability in accordance with the provisions of the section 32 of the rights of persons with Disabilities ACT, 2016. They should produce a current/recent year Certificate of Civil Surgeon stating the type of disability, extent (%) of disability and state (Progressive/non-progressive) of disability. Only those students who have minimum 40% disability are eligible to be considered for the reservation.
- Reservation for Defense & Ex/In- Servicemen: 1% seats of the total seats (to be included under each different category with in the limit of total reservation under a particular reservation category like SC/ST/SEBC/GEN) are reserved for the wards of Defense & Ex/In-Servicemen.

- Reservation for Kashmiri Migrants: 1% supernumerary seat reservation quota (Additional seats, NOT included under each different category with in the limit of total reservationunder a particular reservation category like SC/ST/SEBC/GEN).
- **Advantage to Sports Persons: Please note that the benefit to sports persons is granted ONLY if the student has participated/awarded medals in State level or higher-level competitions.**

(a) Students who participated at State level: 3% marks to be added to their eligibility marks

(b) Students who won medal at State level or participated at National level: 5% marks to be added to their eligibility marks

(c) Students who have Won medal at National level or participated/won medal at International level: To be granted Direct admission

(d) Reservation for wards of MSU Staff: 1% supernumerary seat reservation quota (Additional seats, NOT included under each different category within the limit of total reservation under a particular reservation category like SC/ST/SEBC/GEN). This reservation is applicable only in Regular Payment Fee Category for the wards of the permanent or temporary employees of The Maharaja Sayajirao University of Baroda. They should produce relevant documents at the time of admission.

(e) If the seats remain vacant after stipulated admission rounds in the SC or ST reservation categories, then these seats can be interchanged among SC and ST.

(f) After granting admission to all the students of any reserve category on respective reserve seats, if the reserved category seats remain vacant then these seats shall be transferred to General (Unreserved) category seats.

Supernumerary seats which remain vacant shall NOT be transferred to any other category.

Admission Fees is to be paid through online mode only.
CASH/CHEQUE OR ANY OTHER MODE OF TRANSACTION IS NOT ACCEPTED

INSTRUCTIONS TO THE CANDIDATES

- The admissions will be strictly based on the merit. Just fulfilling the eligibility criteria DOES NOT GUARANTEE admission.
- The admission to the course is PURELY TEMPORARY and subjected to the various scrutiny till the unique Permanent Registration Number (PRN) of the candidate is generated.
- If the information provided by the candidate is found incorrect or if any unfair practice is followed or the candidate is unable to submit any of the required certificates in the stipulated time period, his/ her admission is liable to cancellation.
- Maintenance of Stipulated Attendance of Students (Ordinance 183)

The following shall be the minimum attendance necessary:

- In a semester an overall attendance of at least 75% of the number of lectures delivered and tutorials, seminars etc. arranged in all subjects, provided the total attendance in each of the subjects offered is at least 60%.
- In a semester an overall attendance of at least 80% of the days allotted for practical classes and laboratory work in each subject.

General rules governing the conduct of students in the university:

- A student must do nothing either inside or outside the University that will interfere with its orderly working and discipline.
- Impolite or unseemly behavior in classroom or University premises during working hours of the College and the Faculty.
- Attempt to persuade other students to abstain themselves from regular classes.
- Damage to or defacement of University furniture, fittings and property.
- Disobedience of notifications or instructions issued by the Principals/Deans/Heads of the Departments and Members of the staff duly authorized.
- As per UGC regulation, stipulated attendance (Ordinance 183) is required for permitting students to appear for final examination. If unavoidably absent on account of health, urgent private affairs or other reasons, they must be prepared to state the exact reason for absence.
- Students are expected to behave with courtesy towards the members of the staff, their fellow students and all visitors to the Institution.
- Sexual harassment will lead to severe punishments like suspension, rustication from the University / College/ Institution. Disciplinary actionist as prescribed under The M. S. University of Baroda rules.
- Ragging is prohibited in MSU Campus, ragging is a criminal offence andis liable to severe punishment, including suspension, rustication and imprisonment.
- **Compulsory Thalassemia Blood Screening:** Thalassemia blood testing is made compulsory by Government of Gujarat. Final Eligibility of any student for admission to any course to this University will be granted ONLY after she/ he submits report of the Thalassemia blood screening..

GRADE POINT SYSTEM

A system comprising of 7 grade points (4 to 10) will be followed for evaluating a candidate in every course. Both mid-semester and end-semester exams are counted for final grade points.

Grade Points	Description	Percentage of Marks	Division/Grade	Range
10	Outstanding	90%-99%	First/O	Above9.01
9	Excellent	80%-89%	First/A	8.01–9.00
8	Very Good	70%-79%	First/ B	7.01–8.00
7	Good	60%-69%	First/ C	6.01–7.00
6	Fair	50%-59%	Second /D	5.01–6.00
5	Average	40%-49%	Pass /E	4.01–5.00
4 – 0	Dropped	Below 40%	F	Below 4.00

CGPA	Class
CGPA<4	Fail
4 =CGPA<5	Pass Class
5 =CGPA<6	2nd Class
6 =CGPA<7	1St Class
CGPA≥7	Distinction

Grade Point Average = ∑(Credit X Grade Point) / Total Credits

AWARD OF CLASS

Marks-sheets of semester I to III of M. Sc. will simply indicate result as either Pass or Fail or ATKT but not the class which will be indicated in the last Semester mark sheet.

Cumulative Grade Point Average (CGPA) is computed as:

CGPA=∑(Semester credits X GPA)/Total Semester Credits

The sum is taken over from Sem-I to Sem-IV for M.Sc.

CRITERION FOR M.Sc. DEGREE AWARD

For obtaining M.Sc. degree in any subject, a candidate has to earn minimum100 credits in all during the program

M.Sc. Physics

ADMISSION OPEN 2023-24

https://admission.msubaroda.ac.in//applicant/#/application-programme-list

Entrance test on 26/6/2023
2:30 pm to 4:00 pm

About Department

⇨ faculty members are experts in their respective fields, with extensive knowledge and experience in teaching, research, and innovation.

⇨Rich in Alumni, fellows, and noble Lorient who contributed to the community.

M.Sc. Projects in

- Condensed Matter Physics
- Nuclear Physics
- Electronics
- Spectroscopy

- 281-Published International/National Research Paper
- 39 h-Index

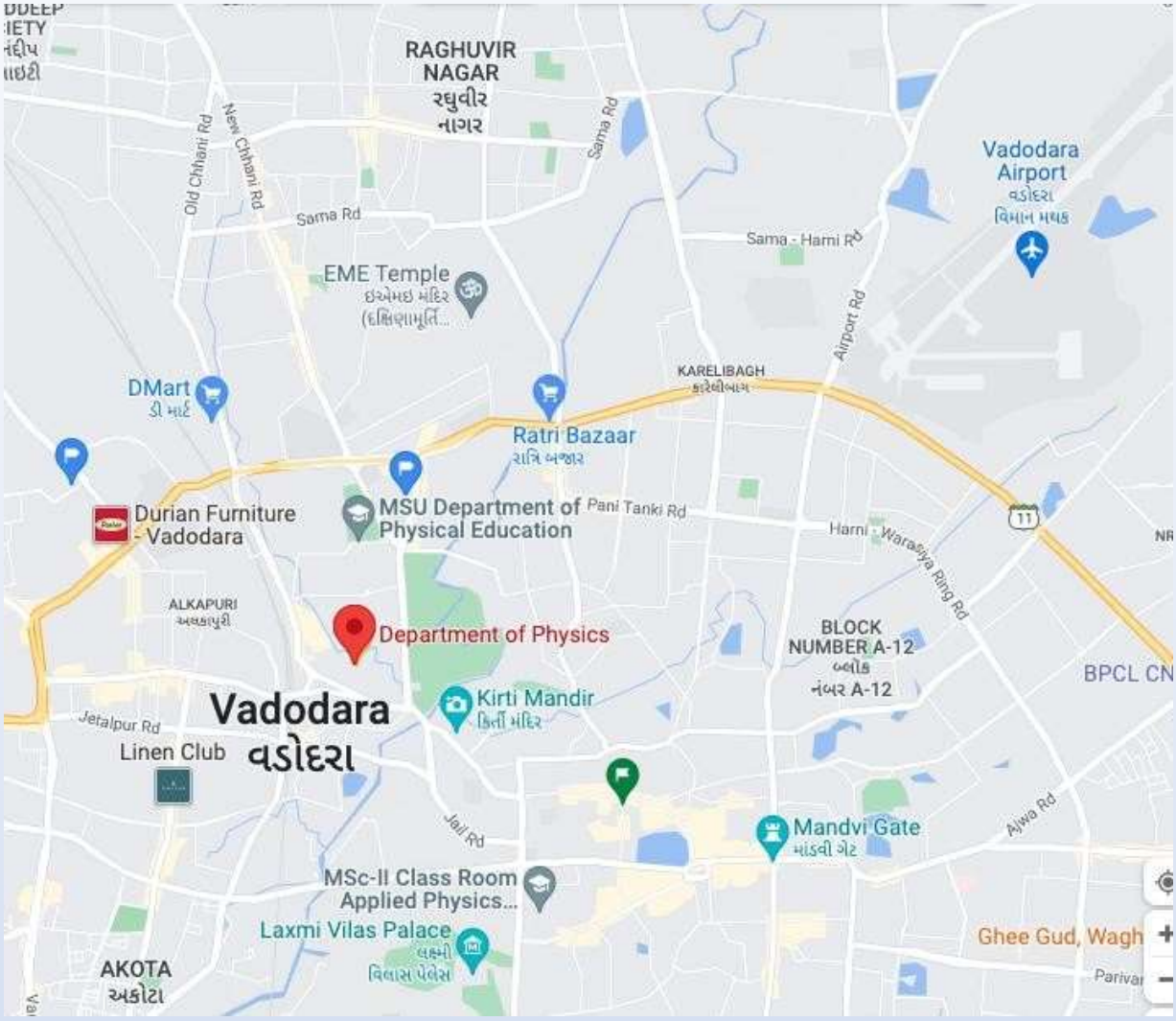
Advance Syllabus

Advanced syllabus in physics covers some of the most fundamental concepts in the field, such as quantum mechanics, electromagnetism, relativity, thermodynamics, and statistical mechanics.

Foremost in research

Research-oriented study build up fosters critical thinking, problem-solving, innovation, and generate new knowledge that can help solve real-world problems

How to reach the Department



From Airport: 5.5 km
From Railway Station: 500 m
From Bus Station: 500 m
From Ahmedabad via NE1: 2 hours journey

Contact Details:

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