

DEPARTMENT OF PHYSICS UNIVERSITY OF PERADENIYA

EXPLORE, CREATE, INSPIRE

DIGITAL PROSPECTUS

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WHERE WE ARE University of Peradeniya

The University of Peradeniya is a renowned institution of higher education located in the heart of the Central Province of Sri Lanka, near the historical city of Kandy, and surrounded by the lush greenery of the Hanthana mountain range. Established in 1942, the university has a rich history of academic excellence and social progress and offers a wide range of undergraduate and graduate programs across diverse fields of study. The university is home to a talented faculty of scholars. researchers. and practitioners, who are dedicated to intellectual curiosity, fostering thinking, and critical social responsibility among students. With state-of-the-art facilities and a commitment to innovation and community engagement, the University of Peradeniya is an ideal place for students to pursue their academic and professional goals. University of Peradeniya is the largest and most comprehensive university in Sri Lanka with the residential capacity for more than 9000 students





Faculty of Science



The Faculty of Science of the University of Peradeniya offers undergraduate programs in a range of scientific disciplines, including physics. Faculty members are experts in variety of fields and actively involved in research. The faculty provides a solid foundation in the basic sciences, which is essential for understanding physics concepts. This, along with the faculty's research activities, provides a stimulating intellectual environment that can inspire and motivate students to pursue their own research interests. Overall, the Faculty of Science is an essential component of the University of Peradeniya. It produces the highest number of research publications when compared to other Faculties. Faculty of Science plays an important role in preparing students for careers in academia, industry, and government sectors.

Department of Physics



The Department of Physics at the University of Peradeniya has a long and proud history of academic excellence and scientific innovation. Since its establishment in 1953, the department has achieved many milestones, including the establishment of its first graduate program in 1969, and the opening of the first solid-state physics laboratory in Sri Lanka in 1975. The department has also been recognized for its research excellence, with several faculty members receiving prestigious national and international awards for their contributions to the field of physics. Today, the department continues to be a leading center of scientific inquiry and discovery, attracting a diverse and talented student body, and producing cutting-edge research in areas such Material sciences, Energy harvesting and storage, Nuclear Physics, Bio and Medical Physics, and Astrophysics.

Our mission:

is to impart fundamental knowledge to our undergraduates and postgraduates so that they are equipped with strong foundation to embark on a career of their choice to serve the society.

OUR COMMITMENTS AND KEY HIGHLIGHTS OF THE DEPARTMENT



Opportunity and Value

Department of Physics is an engine of opportunity, providing the best Physicist who has a solid foundation for various career pathways.



Active Learning

Students learn actively through problem solving, creativity critical thinking and inventions.



Theoretical & Experimental Focus

Department focus on theoretical and experimental physics as the development of science depends on both.



Department has received A grade for all criteria during subject review by Quality Assurance Council, UGC.



Biology stream students can enroll in Physics Honours study program.

100%

of Physics Honours graduates get admitted for Postgraduate programmes in prestigious universities



Exceptional undergraduate research output and recognized by professional bodies such as Institute of Physics, SL.

Potential Careers

Why Study Physics?

Physics is a fascinating and essential field that helps us understand the fundamental laws of the universe. By studying physics, one will develop valuable analytical and problem-solving skills and gain a deep appreciation for the natural world. From electronics to medical technology to the exploration of the cosmos, physics has countless applications in modern society.

Physics is a versatile field that opens up a wide range of career paths for graduates. A degree in physics can lead to exciting and rewarding careers in industry, research, academia, and beyond. Physics graduates are highly valued for their analytical and problem-solving skills, as well as their ability to think creatively and outside the box. Below are just a few of the many career paths available to physics graduates, but the possibilities are endless.

Careers in Physics

Aerospace engineer	Research scientist	Patent attorney
Software engineer	Data scientist	Climate scientist
Materials engineer	Medical physicist	Meteorologist
Nanoengineer	Geophysicist	Nuclear engineer
Astrophysicist	Quantum information scientist	Environmental scientist

Academic Pathways

Are you a student who passed GCE Advanced Level and passionate about science and ready to take on a new challenge? Pursuing a major in the Faculty of Science at the University of Peradeniya, specifically in the field of Physics, is an exciting opportunity to develop your knowledge and skills in a field you love. The following flowchart will provide with a step-by-step guide on how to take the next step towards your dream career in science.



Admission & Course Details

Admission to any study program is based on general admissions to the Faculty of Science, University of Peradeniya by UGC.

Subject Combinations

In the first year of Study Programs, following are the seven possible subject combinations to have Physics as one of the Major Subject areas when enroll as a student of the faculty of science.

Subject Combination	Combination Number
Biology Chemistry Physics (BCP)	4
Chemistry Geology Physics (CGP)	15
Chemistry Mathematics Physics (CMP)	19
Physics Mathematics (PMM)	27
Physics Computer science Geology (PCG)	28
Physics Mathematics Computer science (PMC)	31
Physics Mathematics Statistics (PMS)	32

Contribution to Academic Programs

Discover the endless possibilities of an academic pathway at the Department of Physics. From undergraduate programs to graduate research, we offer 3-degree programs to explore your passion for physics and achieve your career aspirations.



The M.Sc. programs in Physics include:

- M.Sc. in Medical Physics
- M.Sc. in Physics of Materials

Undergraduate Physics Fields of Study

Embark on a thrilling journey through the fascinating subject areas of physics as an undergraduate, where you will have the opportunity to explore and excel in the following areas while indulging in the unparalleled depth of knowledge and understanding that the Department of Physics offers.



As an undergraduate, whether you are following a general or special degree program, you will have the opportunity to pursue your passions in the above-mentioned subject areas by taking physics as a subject. The Department of Physics is dedicated to providing you with the necessary tools and guidance to achieve success and excel in your academic journey.

Graduate Profile

At the Department of Physics, our graduate profiles are a testament to the excellence of our academic programs. Our graduates are equipped with the knowledge, skills, and expertise to make a meaningful impact in their chosen careers.



Physics Course Details

Welcome to the Department of Physics' undergraduate course table! We are excited to offer an array of courses that cover a broad range of physics subjects. Whether you are pursuing a general or special degree program, our courses provide you with the essential knowledge and skills to succeed in your academic journey.

First Year (1000 Level)

1000 LEVEL - PHYSICS					
Course		No. of	Pre-	Compulsory	
Code	Course little	Credits	requisites	Hons.	B.Sc.
PHY1103	General Physics I	3		V	V
PHY1203	General Physics II	3	5	V	V
PHY1911	Elementary Physics Laboratory I	1		V	V
PHY1921	Elementary Physics Laboratory II	1		V	V
	Total	08		08	08

Second Year (2000 Level)

2000 LEVEL - PHYSICS					
Course		No. of	Pre-	Compulsory	
Code	Course Title	Credits	requisites	Hons.	B.Sc.
PHY2102	Mechanics and Fluid Dynamics	2	PHY1103	V	V
PHY2112	Vibrations and Waves	2			
PHY2302	Introductory Quantum Mechanics and Atomic Physics	2	PHY1203	V	V
PHY2402	Statistical Physics & Thermodynamics	2	PHY1103	×	V
PHY2812	Introductory Astronomy	2			a: 0
PHY2822	Medical Physics	2			
PHY2842	Energy and the Environment	2			0
PHY2852	Circuit Theory & Introductory Electronics	2		V	
PHY2911	General Physics Laboratory I	1	PHY1911, PHY1921	1	V
PHY2921	General Physics Laboratory II	1	PHY1911, PHY1921	\checkmark	Ń
PHY2931	Electronic Laboratory I	1	PHY2852	V	
	Total	19		11	08

Third Year (3000 Level)

3000 LEVEL	- PHYSICS		6		
Course Course Title		No. of	Pre-	Comp	ulsory
Code	course ritte	Credits	requisites	Hons.	B.Sc.
PHY3102	Classical Mechanics	2	PHY2102	\checkmark	
PHY3112	Special Relativity	2		Ń	
PHY3212	Physical Optics and Optical Instruments	2	PHY1103	V	√
PHY3302	Quantum Mechanics I	2	PHY2302	V	
PHY3502	Nuclear Physics I	2		V	V
PHY3512	Elementary Particle Physics	2			
PHY3602	Solid State Physics I	2		V	V
PHY3612	Semiconductor Physics and Devices	2		2	
PHY3622	Structures and Properties of Materials	2		2	
PHY3703	Mathematical Methods in Physics	3		V	
PHY3712	Computational Physics	2		25 23	
PHY3812	Astrophysics	2			
PHY3822	Biophysics	2		82 17	
PHY3832	Health Physics	2			
PHY3842	Physics of Atmosphere, Weather and Climate	2		60-	
PHY3852	Advanced Electronics	2	PHY2852	10 12	
PHY3862	Experimental Techniques and Material Characterization	2		2	
PHY3872	Introductory Nanoscience	2			0
PHY3911	General Physics Laboratory III	1	PHY1911, PHY1921	V	V
PHY3921	Applied Physics Laboratory	1	PHY3911		
PHY3932	Advanced Physics Laboratory I	2	PHY2911, PHY2921	V	0
PHY3942	Advanced Physics Laboratory II	2	PHY2911, PHY2921	\checkmark	14
PHY3951	Electronics Laboratory II	1	PHY2931		55.
PHY3992	Scientific Writing and Seminar	2		V	20 12
	Total	48		24	09

Fourth Year (4000 Level)

4000 LEVEL	- PHYSICS				
Course	Course Title	No. of	Pre-	Compulsory	
Code	Course The	Credits	requisites	Hons.	
PHY4112	General Relativity	2			
PHY4122	Introduction to Cosmology	2	PHY4112		
PHY4202	Electromagnetic Theory	2	PHY3202	\checkmark	
PHY4302	Quantum Mechanics II	2	PHY3302	\checkmark	
PHY4312	Quantum Mechanics III	2	PHY4302		
PHY4402	Statistical Physics	2	PHY2402	\checkmark	
DUDIACOO			DU12/2602	*	
PHY4502	Nuclear Physics II	2	PHY 3502		
PHY4512	Nuclear Reactor Physics	2	PHY3502	a:	
PHY4522	Radiation Detection and Measurement	2			
PHY4602	Solid State Physics II	2	PHY3602	*	
PHY4622	Magnetic Materials and Superconducting Phenomena	2	PHY2402		
PHY4632	Ion Conducting Materials and Devices	2			
PHY4642	Polymer Physics	2	2		
PHY4852	Data Acquisition and Signal Processing	2	PHY3852		
PHY4872	Nanophysics	2	PHY3872/ CHE3723		
PHY4912	Advanced Physics Laboratory III	2	PHY3942	Ń	
PHY4922	Investigatory Physics Laboratory	2	r	Ń	
PHY4996	Research Project	6		\checkmark	
SCI4003	Industrial Training	3	5	S ()	
	Total	43		18	

Recognition of Achievements

Awards



Awards do not only acknowledge success, they recognize many other qualities: ability, hard work, effort, and excellence. Department offers a range of prizes to deserving students to recognize their achievements. Department awards three memorial prizes and two gold medals. To win these prizes and medals students need to achieve the stipulated conditions.

For example, to win Prof. V. Appapillai Memorial Prize in Physics, student must be the best performer in 1000 and 2000 level Physics courses and must be selected to follow the B.Sc. Honors Study Programme in Physics.

Prizes and Gold Medals



Following are the memorial prizes offered by the Department:

1/ C. A. Hevavitharana Memorial Prize,

2/ V. Appapillai Memorial Prize and

3/ A. W. Wolfendale Prize.

Following are the Gold medals awarded by the Department:

1/ George Dissanaike Memorial Gold Medal and

2/ Lakshman Dissanayake Gold Medal.

These prizes and medals are testaments of the Department's commitment in appreciating and rewarding the excellence in academic achievement.

Prizes

C. A. HEVAVITHARANA MEMORIAL PRIZE FOR PHYSICS



The prize is awarded to the student with the best overall performance in the Honours Study Programme in Physics. V. APPAPILLAI MEMORIAL PRIZE FOR PHYSICS



The prize is awarded to the student with the best performance in 1000 and 2000 level Physics courses and was selected and registered to follow Honours Study Programme in Physics.

A. W. WOLFENDALE PRIZE FOR PHYSICS



The prize is awarded to the student with the best performance during the first year of the Honours Study Programme in Physics.

Gold Medals

GEORGE DISSANAIKE MEMORIAL GOLD MEDAL FOR PHYSICS



The gold medal is awarded to the student with the best performance at the examinations of the 3000 and 4000 level compulsory courses in Honours Study Programme in Physics. LAKSHMAN DISSANAYAKE GOLD MEDAL FOR EXCELLENCE IN PHYSICS



The gold medal is awarded to the Physics Honours student who has recorded the highest GPA of not less than 3.70 for the compulsory Physics courses at the 1000, 2000, 3000 and 4000 levels.

Student Life

Physical society







The Physical Society of the Department of Physics at the University of Peradeniya has been an integral part of the department for over half a century. Established in 1969 with the beginning of the BSc Physics Special Degree Program, the society has provided a platform for students to explore and engage with the fascinating world of physics beyond their academic curriculum. Over the years, the society has organized various events and activities, including Physics Padura, workshops, science camps for students in rural areas, the development of faculty resources, and the publication of Echo magazine. The society has also hosted guest lectures by eminent physicists, providing students with the opportunity to interact with experts in the field. As a result, the society has played a crucial role in promoting physics education and research at the university.

Astronomical society

The Astronomical Society of University of Peradeniya is a leading society within the Department of Physics, dedicated to promoting astronomy education and awareness at the university and in the wider Kandy district. Our focus is on fostering an understanding of the various astronomical phenomena, while improving observatory skills among our society members and the public. We strive to contribute our expertise to local schools in the Kandy district, by organizing various astronomical events. These events include the university Astro night, guest lectures, quiz competitions, and other astronomy-related activities like the water rocket competition and observation sessions. Our aim is to inspire students to take an interest in astronomy and physics by making these subjects accessible and engaging.

> https://as.soc.pdn.ac.lk/





Annual Activities

The Department of Physics not only provides quality education, but also engaged in a variety of annual activities through its student bodies: Physical Society and Astronomical Society to enhance student staff interaction and other soft skills. From Padura music sessions and Sixes cricket matches to Grad Night, Physics Got Talent, Cultural and Religious Events, Charity Events, Outreach activities such as Teaching in Rural Areas are very popular among the students. Visits to industries and centers help students to develop skills, relate real life experience, and create lasting memories.





Outreach Activities





At the Department of Physics, we believe in making a positive impact in the community through outreach activities. A variety of workshops and seminars for school students are organized to promote scientific curiosity and understanding. Department members actively teach at the Science Education Unit (SEU) of the Faculty of Science, providing quality education to students from diverse backgrounds. Science camps are organized by SEU for school students, where they can engage in scientific experiments and discussions. Furthermore, we promote scientific awareness and inspire students to pursue careers in science. These outreach activities provide our undergraduate students with opportunities to develop various skills, engage in scientific discussions and make a positive impact on society.

GET TO KNOW PEOPLE

The Department of Physics is home to a diverse community of academic and non-academic staff who work together to support students. The highly qualified academic staff engage in cutting-edge research and teach courses to help students develop a deep understanding in physics. Temporary staff also play a crucial role in supporting teaching, lab classes, and marking of reports and tutorials. The role of non-academic staffs are vital for maintaining the department's facilities, infrastructure and ensuring a safe and conducive environment for teaching and learning.

Academic Staff

Dr. V. Sivakumar B.Sc. (PDN, Sri Lanka), M.Sc., Ph.D. (Georgia State Univ., USA) Department Head/ Senior Lecturer

Graduated in 1993 with B.Sc. Honours in Physics, University of Peradeniya, joined the Department of Physics as a temporary assistant lecturer in 1994 and became the lecturer probationary in 1995. Obtained a Ph.D in Physics, specializing in Biophysics in 2004 from Georgia State University, Atlanta, USA. Serving as a Senior Lecturer in the Department, from 2004.

Research interests: Medical Physics: Dosimetry in diagnostic procedures in X-ray related techniques and establishing national Diagnostic Reference Levels (DRLs), Synthesis of lead- free radiation protection materials for medical procedures. Biophysics: Solar energy conversion in plants and bacteria: ultrafast photoreactions in photosystems using laser flash photolysis, Computational studies on molecular structure and variations using Density functional theory.



Prof. L.R.A.K. Bandara B.Sc., Ph.D. (PDN, Sri Lanka) Professor in Physics



I earned a B.Sc.(special) Degree in Physics from the University of Peradeniya, Sri Lanka in 1994. In 2000, I completed my Ph.D. on Ion Conducting Polymers at Chalmers University of Technology, Sweden. I joined the Department of Physics at the University of Peradeniya in 2000 as a Senior Lecturer, and later became a professor in 2017. Additionally, I had a post-doctoral position at LEPMI, Grenoble Institute of Technology, France in 2007/2008 as part of a cultural exchange program offered by the French Embassy of Sri Lanka.

Research interests: Solid State Ionics, Materials, Polymer Electrolytes, Dye-sensitized solar cells, Li-rechargeable batteries, Dielectric properties of materials

Prof. T. M. W. J. Bandara
Professor in PhysicsB.Sc. (RUH, Sri Lanka),
M.Phil., Ph.D. (PDN, Sri Lanka)

I obtained my undergraduate degree in Physics from the University of Ruhuna, Sri Lanka, in 1996 with honors, and immediately after I joined the same university as an assistant lecturer in the Dept. of Physics and served there for three years. Then I joined the Faculty of Applied Sciences, Rajarata University of Sri Lanka, where I served as a lecturer from 2002 to 2010. In 2010, I completed my Ph.D. in physics from the University of Peradeniya, Sri Lanka, with a thesis on the synthesis and characterization of polymer electrolytes to be used in photoelectrochemical solar cells. Then I was promoted as a senior lecturer Gr. II in the Dept. of Physical Sciences at the Rajarata University of Sri Lanka, where I worked until 2018. In 2018, I joined the Dept. of Physics at the University of Peradeniya as senior lecturer Gr. I was promoted to the rank of professor in 2019, which is a testament to my outstanding contribution to the field of physics.



My research focuses are on developing new materials for solar energy applications, particularly in the area of photoelectrochemical solar cells. I have contributed to more than 50 conference presentations. In addition, I have published more than 60 research papers in peer-reviewed journals and have received numerous research and teaching awards for my contributions to the field, including the Sri Lanka President & amp;#39;s Award for Research on eight occasions.

Research interests: I am conducting research in materials science and solar energy conversion and storage. My specific research interests are related to Sustainable energy, Photo-electrochemical solar cells, Electro-physics, Dielectric analysis, Chemical Physics, Graphene, and Graphene quantum dots, Supercapacitors.

Dr. P.W.S.K. Bandaranayake B.Sc., Ph.D. (PDN, Sri Lanka) Senior Lecturer



I joined the Department of Physics as Temporary Asst. Lecturer on 02.01.1986 and started Solid State Ionic research work at Peradeniya as a Sandwiched Ph.D. student. I obtained my Ph.D. in May 1991 after continuing research work for 02 years and 06 months at Chalmers University of Technology, Sweden. I worked as a postdoctoral fellow in LIES, ENSEEG, Grenoble, France with various professors from Sept 1992 to Sept 1992 and 06 months in 1994. In LIES, I worked on Glass, polymers, and Graphite.

Research interests: Research on solid electrolytes and devices, Investigation of conducting glass, Research on energy conversion and storage devices.

Dr. N. L. Dasanayake Senior Lecturer

B.Sc. (PDN, Sri Lanka), Ph.D. (Washington Univ. in St. Louis, USA)

I graduated from the University of Peradeniya in 2006 with a B.Sc. with honors in Physics. Upon graduation, I worked as a temporary demonstrator in the Physics department for a year. In 2007, I entered the Washington University in St. Louis and obtained my PhD in physics in 2013, where I specialized in biophysics of cell mechanics. Investigated the effects of the network structure on intracellular force generation via simulation of myosin mini-filament motion through a random actin network and demonstrated the generality of actomyosin contractility for the first time.

Research interests: Computational biophysics



Dr. B.S. Dassanayake Senior Lecturer



B.Sc. (PDN, Sri Lanka), Ph.D. (Western Michigan Univ., USA)

I have been attached to the Department of Physics, University of Peradeniya as a Senior Lecturer since 2012. I received my Ph.D. from Western Michigan University, USA, in 2011, after earning my B.Sc. Honours in Physics from the University of Peradeniya in 2004.

Research interests: my research interests include semiconductor thin films, thin film II-VI photovoltaics and nano synthesis.

Dr. J.A.C.P. Jayalath Senior Lecturer

B.Sc. (PDN, Sri Lanka), Ph.D. (Hampton Univ., USA)

Graduated in 2001 with B.Sc. Honours in Physics, University of Peradeniya. Obtained Ph.D. in Physics, specializing in Particle Physics, in 2010 from Hampton University, Virginia, USA. Joined the Department of Physics as a Senior Lecturer in 2011.

Research interests: Phenomenology in hadronic physics, Applied nuclear Physics



Dr. E.N. Jayaweera B.Sc., Ph.D. (PDN, Sri Lanka) Lecturer



I received my B.Sc. (Special Degree in Physics) in 2010, and my Ph.D. in 2016 from the University of Peradeniya, Sri Lanka. I worked as a Postdoctoral Researcher at the Department of Electrical and Computer Engineering, Sungkyunkwan University in South Korea from 2017 to 2019. I then worked as a Postdoctoral Researche<mark>r at Sri</mark> Lanka Technological Campus from 2019 to 2020. I joined the Department of Physics in December 2020.

Research interests: Dye-sensitized solar cells, micro-scale energy harvesting

Dr. J.P. Liyanage B.Sc., Ph.D. (CBO, Sri Lanka) Senior Lecturer

I graduated with a B.Sc. Honours degree in Physics from University of Colombo, in 1997 and then went on to obtain a Ph.D. in 2006 from the same University. The Ph.D. was in the area of "Physics of Lightning and electrical discharges" which was a interdisciplinary work covering several areas of Physics and High Voltage Engineering. Major part of research work was carried out at Division for Electricity and Lightning Research, Uppsala University, Sweden and International Centre for Lightning Research, University of Florida, Florida, USA. I have been working as a teacher and a researcher in both foreign and local Universities since 1998.



Research interests: My research interests include Electrical discharges and Lightning, Physics

Dr. D.R.A. Mendis B.Sc. (KLN, Sri Lanka), Senior Lecturer

Ph.D. (Kansas State Univ., USA)



I graduated with honors in Physics from University of Kelaniya in 2012. After serving as a Probationary Lecturer at University of Peradeniya in 2013, I pursued my PhD in Kansas State University and completed my research on "Search for vector-like T quarks using events with oppositely charged lepton pairs and jets in proton-proton collisions at centre-of-mass energy of 13 TeV with CMS detector" in 2019. I am now a Senior Lecturer at the Department of Physics, University of Peradeniya.

Research interests: High Energy Physics - Specially related to vector-like-quarks (VLQ's) and beyond standard model (BSM), Nuclear Physics

Dr. L. K. Narangammana Senior Lecturer

I graduated in 2007 with B.Sc. Honours in Physics from University of Peradeniya and went on to earn a doctoral degree in condensed matter physics at the University of Connecticut, USA. My research focused on fabrication and characterization on superconducting thin films, and I have hands-on experience with many experimental techniques such as pulsed laser deposition, neutron diffraction, synchrotron and laboratory X-ray diffraction (XRD) and synchrotron and laboratory Mossbauer spectroscopy.

B.Sc. (PDN, Sri Lanka),

MS, Ph.D. (Univ. of Cincinnati, USA)

B.Sc. (PDN, Sri Lanka),

Ph.D. (Univ. of Connecticut, USA)



Research interests: Thermoelectric Materials, Conducting Polymers, Microfluidics

Dr. K. Pemasiri Senior Lecturer



I received my undergraduate degree (BSc special degree in Physics) in 2004 from the University of Peradeniya and then did postgraduate studies at University of Cincinnati, USA from 2006 and received PhD in 2013 on "Optical characterization of semiconductor nanowires". My research interests focus mainly on semiconductor material research.

Research interests: Optical & electrical characterization of semiconductor nanostructures, semiconductor solar cells, Thermoelectric materials

Dr. T.P. Ranawaka Senior Lecturer

B.Sc. (PDN, Sri Lanka), Ph.D. (Univ. of Houston, USA)

Graduated in 2005 with B.Sc. Honours in Physics, University of Peradeniya. Obtained Ph.D. specializing in Medium Energy Physics in 2012 from the University of Houston, USA. Joined the Department of Physics, Peradeniya University as a Temporary Senior Lecturer in 2012 and became a permanent staff member in 2013.

Research interests: Nuclear Physics, Particle Physics, Astrophysics, General Relativity, Cosmology



Prof. P. Samarasekara **Senior Professor in Physics**

B.Sc. (KLN, Sri Lanka), Ph.D. (City Univ. of New York, USA)



Immediately after graduating from the university of Kelaniya with B. Sc Special (Hons) degree in 1985, I joined the university of Kelaniya as a temporary demonstrator. Then I joined the university of Ruhuna as a probationary lecturer in 1986. I earned Ph.D in the experimental condensed matter Physics in 1996 from the City University of New York (CUNY). In 1996, I returned to the university of Ruhuna as a senior lecturer. I researched semiconductor particles doped with salts under Professor K. Tennakone from 1986-88, and magnetic thin film preparation and characterization for my Ph.D. from 1990-96. After returning to the University of Ruhuna, I conducted research on semiconductor films and theoretical study of magnetic thin films. In 2008, I joined the University of Peradeniya and conducted research on theoretical Physics and spin-coated semiconductor thin films. In addition to teaching undergraduate and graduate Physics courses for 37 years, I also had Postdoctoral research experiences in mechanical, industrial, and manufacturing engineering at the University of Toledo in 2007.

Research interests: Condensed matter theoretical and experimental Physics

Dr. V. A. Seneviratne B.Sc. (PDN, Sri Lanka), Senior Lecturer

M.Sc., Ph.D. (Univ. of Oklahoma, USA)

Graduated from The University of Peradeniya obtaining a B.Sc. (Special) Degree in Physics in 1996 and joined the Department of Physics as a Lecturer (Probationary) in 1997. Earned the Ph.D. in Physics at the University of Oklahoma, Norman, USA in 2004 specializing in experimental condensed matter physics.

Research Interests: The solid and quasi solid polymer and non-polymer electrolytes for various electrochemical applications and applications of polymer composites. Understanding the complex structure property relations present in polymer electrolytes and composites. Synthesis and characterization of semiconductor thin films for photovoltaic applications.



Dr. K. B. Wijayaratne B.Sc. (PDN, Sri Lanka), Senior Lecturer

MA, Ph.D. (Univ. of Virginia, USA)



B.Sc. Physics (Special), University of Peradeniya, Sri Lanka. Ph.D. Experimental Condensed Matter Physics, University of Virginia, USA Ph.D. thesis "Photoelectron Spectroscopy of Transition Metal Chalcogenides: Charge Density Wave Phase and Thermoelectric Performance" Worked as a lecturer in University of North Carolina System.

Research interests: Experimental Condensed Matter Physics, Renewable Energy, Biomedical Physics, Electrical and electronic Instrumentation, Science Education and pedagogy.

Emeritus Professors



Prof. M.A.K. L. Dissanayake



Prof. B. S. B. Karunaratne



Prof. M. A. Careem

The Department of Physics proudly has emeritus professors, Prof. M.A.K. L. Dissanayake, Prof. B. S. B. Karunaratne, and Prof. M. A. Careem. These esteemed professors have made significant contributions to the field of physics through their research and teaching. In addition, we have retired professors and Senior lecturers who have inspired and mentored generations of students and researchers. All these great resource persons are immensely contributed to the development of the Department and to the advancement of physics both nationally and internationally.

Temporary Staff

Each year, the Department appoints about 20 temporary academic staff. Most of them are recently graduated students from Physics Honour study Programme. They work as teaching assistants, demonstrators lab sessions, facilitators during discussion classes, and evaluators of tutorials, and lab reports. They play a critical role in enhancing the studentcentered learning, mainly in labs and discussion classes.

Non-Academic Staff

The Department of Physics has a team of dedicated non-academic staff members who play a vital role in supporting the department's operations. This team includes technical officers, lab attendants, work aides, a mechanic, a carpenter, and a management assistant. They provide essential support in maintaining the department's equipment, organizing, and preparing laboratory experiments, and ensuring the safety and conducive environment. They contribute significantly to the department's success in providing quality education and research opportunities.

Research

Our members of the academic staff and students are engaged in research across a broad range of areas, from theoretical Physics to experimental Physics, astrophysics to atmospheric Physics and condensed matter Physics to Medical Physics. Research laboratories in the Department has adequate facilities to carryout research projects. Members also collaborate with members of other departments, faculties, and other research institutes and universities.

Areas of Ongoing Research

Energy Conversion and Storage

The Department conducts scientific research on the development of materials and devices for energy conversion and storage. Regarding energy conversion, the research on 2nd generation solar cells that uses II-VI compounds is conducted using advanced fabrication methods such as close-spaced sublimation, thermal evaporation, electrodeposition chemical bath deposition, and spray coating techniques. Research on thin film solar cells based on chemical bath deposited ZnO/CuO is also in progress. In addition, the development of 3rd generation solar cells that includes nanostructured dye-sensitized solar cells, quantum dot-sensitized solar cells, graphene-incorporated solar cells, perovskite solar cells, and solid-state photoelectrochemical solar cells is a main research focus. Regarding energy storage devices the Department members and students are undertaking a variety of research exploring materials for supercapacitors and secondary batteries. Basic theoretical research, modeling of materials and devices, and fabrication of materials and devices are conducted in our labs. Further, research on the development of fuel cells in particular microbial fuel cells, and the development of thermoelectric generators are other key research areas.

Material Science

The studies carried out at the department are primarily focused on the synthesis of nanomaterials with various morphologies and their composites, and the exploitation of their intriguing properties in real-world applications. Few such projects are utilization of ZnO nanowires for gas sensing applications and recyclable paramagnetic MgO nano adsorbent for efficient removal of heavy metal ions and organic pollutants from wastewater. In addition, the properties of various materials are being examined and modeled using mathematical models. In one such study, visible light-activated antibacterial paint based on copper-doped TiO2 nanoparticles has been successfully synthesized. Further, employing a mathematical model and electrochemical impedance analysis, charge carrier transport properties in polymer electrolytes have been investigated.

Physics Education

Primarily physics education refers to the methods currently used to teach physics for meaningful learning. Historically, physics has been taught at the GCE O/L and A/L classes primarily by the lecture method together with laboratory exercises aimed at verifying concepts taught in the lectures. These concepts are better understood when lectures are accompanied with demonstrations, hands-on experiments and questions that require students to ponder what will happen in an experiment and why. Students who participate in active learning for example with hands-on experiments learn through self-discovery. By trial and error, they learn to change their preconceptions and misconceptions about phenomena in physics and discover the underlying concepts. The syllabus of Physics Education under the M.Sc. Science Education programme has been designed and developed to facilitate physics educators to improve their experiences and to share those in a meaningful manner with young physics learners with the aim of correcting any preconceptions and misconceptions and generating an interest and curiosity to learn physics and underlying concepts.

Nuclear Physics

Department conducts nuclear physics related researches mainly focusing on two areas: building and testing the prototype detectors for radiation detection and material characterization using neutron activation analysis (NAA). NAA is a nondestructive method for the qualitative and quantitative determination of elements based on the detection of gamma radiation emitted by the irradiated material after (delayed gamma) or during (prompt gamma) the irradiation to a neutron beam. Department has a facility to conduct delayed gamma ray spectrum analysis in NAA. Researchers are analyzing commercially available samples like gold jewelries, rock samples and samples taken from archeology sites. Prototype detectors have already been built and tested successfully for the detection of cosmic and beta radiation, and muon particles. These detectors are useful in teaching the undergraduate classes. A multidisciplinary postgraduate research study is carrying out to develop a multichannel, multipurpose, digitally configurable analyzer for gamma spectroscopy application.

Instrumentation and Devices

Gas sensors of metal oxides and carbon-based materials are fabricated to detect low concentrations of ethanol, acetone and vapors and harmful gases such as CO_2 , CO and ammonia in air. Thin films of the metal oxides and carbon-based materials deposited on conductive glass substrates are employed for these studies. The resistivity of the sample changes due to the adsorption of the gas or the vapor. Both the oxidation and reduction reactions due to the chemisorption and physisorption processes are studied in detail. Sample preparation conditions are optimized to obtain higher gas sensitivities, lower response times and lower recovery times at lower ppm values of the gas or the vapor. Because the electrical conductivity of a material varies with the temperature according to the Arrhenius equation, the properties of gas sensors are measured at different operating temperatures including the room temperature. The effect of adding different dopants to metal oxide materials on the performance of the gas sensor is also investigated.

Medical Physics

Under medical physics, the researchers are focusing on two main areas: radiation protection and radiation dosimetry. Synthesis of lead-free material that can attenuate high energy photons is the key objective of the University Research Council (URC) funded project. The main application is to utilize the material during medical procedures, which include diagnostic as well as therapeutic applications. Under dosimetry, world bank funded project is underway towards establishing national Diagnostic Reference Levels (DRLs) for Sri Lanka. As initial step, dose auditing and exposure survey are in progress in major hospitals in Sri Lanka. Dose optimization during diagnostic procedures is also undertaken to protect the individuals who engage in this activity.

Computational and Theoretical Physics

Heisenberg Hamiltonian of ferromagnetic and ferrimagnetic thin films is solved using a semiclassical model. Second, third and fourth order perturbations of energy have been taken into account. Heisenberg Hamiltonian with many magnetic energy parameters such as spin exchange interaction, magnetic dipole interaction, second order and fourth order anisotropy, in plane and out plane applied magnetic fields, demagnetization energy and stress induced anisotropy is solved. Furthermore, the model is solved for different thicknesses of magnetic film from ultrathin magnetic films with two spin layers to thick films with 10000 spin layers. The spin reorientation temperature of magnetic thin films is calculated to find the in-plane and out of plane orientation of film. MATLAB software is mainly applied for these simulations. In addition, astronomical data such as Kepler asteroseismic science data are analyzed using computer software packages.

Atmospheric and Ionospheric Physics

Under atmospheric research, research is being carried out on understanding physics of lightning discharges. The main focus of the group is to infer the lighting characteristics by detecting and analyzing broad-band optical/electromagnetic signatures generated by lightning. Recently established VLF antenna has expanded research into studying ELF/VLF signals generated by distant lightning flashes. This has enabled the study of various lightning statistics using 'sferics' etc. and also enabled the opportunity to study the dynamics of equatorial ionosphere.

As part of our commitment in fostering the next generation of physicists, we offer undergraduate students who follow Honours study programme in Physics the opportunity to conduct their own research in their final year. Students can engage in the project of their choice; from proposal submission to report writing, with the approval of the research committee. Some of the research findings have ended up in publications in high index journals. In addition, we

entertain volunteers who would like to get experience as a research assistant in any ongoing projects in the Department.

Publications

The Department of Physics has a rich history of producing groundbreaking research in various fields of physics. In this section, we have compiled a list of the most notable publications from our department in the year 2022. These publications represent the research that our faculty members and students have been engaged in.

We have included some publications in astrophysics, condensed matter physics, nuclear physics, and medical Physics. By reading through this list, you will gain insight into the breadth and depth of the researches conducted in our department. Whether you are a prospective student, a current student, or a researcher interested in collaborating with us, we hope that this list will pique your interest and inspire you to learn more about our research activities.

Some Research Publications in 2022

Nano Energy

"Novel electrode design for energy harvesting devices based on liquid–solid contact and enhancement of effective interface area"

K. Rohana Wijewardhana, E.N. Jayaweera, Jang-Kun Song

STM journals: Journal of Nanoscience, Nanoengineering & Applications

"A solution of fourth order perturbed Heisenberg Hamiltonian with seven magnetic parameters"

M.S.M. Farhan and P. Samarasekara

STM journals: Journal of Nanoscience, Nanoengineering & Applications

"Investigation of Photocatalytic Properties of Microwave Hydrothermal Synthesized ZnO, SnO2 and ZnO/SnO2 Nanocomposites"

J.V.S.S.D. Perera, P.G.D.C.K. Karunarathna and P. Samarasekara

Ionic Research and Engineering Journals

Impact factor 5.83

Impact factor: 7.05

Impact factor: 19.07

Impact factor 7.05

"Development of hole conductivity of CuSCN by adding Mn"

H.M.K.L. Hathurusingha, P.G.D.C.K. Karunarathna and P. Samarasekara

Impact factor: 5.60

"Effect of substrate temperature on electrical properties of RGO thin films deposited by atomized spray pyrolysis"

D.C. Maddumage, S.A. Panamaldeniya, K.M.M.D.K. Kimbulapitiya, D.N.P.R.

Jayakantha, M.A.H.M. Munasinghe, B.M.K. Pemasiri, N. Gunawardhana, B.S. Dassanayake

Materials Chemistry and Physics

Impact factor: 4.78

"An electrochemical route to exfoliate vein graphite into graphene with black tea"

T.M.W.J. Bandara, T.M.A.A.B. Thennakoon, G.G.D.M.G. Gamachchi, L.R.A.K. Bandara, B.M.K. Pemasiri, U. Dahanayake.

Physica Scripta

Impact factor: 3.08

"Time-dependent finite-difference model for transient and steady state analysis of thermoelectric bulk materials"

R.A. Rathnayake, H. Wijekoon, B.M.K. Pemasiri and N.D. Subasinghe

Ionics

"A review of textile dye-sensitized solar cells for wearable electronics"

T.M.W.J., Bandara, J.M.C. Hansadi & Samp; F. Bella

Journal of Applied Clinical Medical Physics

Impact factor: 2.24

Impact factor: 2.96

"Evaluation of patient doses for routine digital radiography procedures toward establishing an institutional diagnostic reference level: A case study in Sri Lanka"

Sachith Welarathna, Sivakumar Velautham, Mihira Wanninayake, Sivananthan Sarasanandarajah,

Journal of Electronic Materials

Impact factor: 2.03

"Organic-Inorganic Hybrid Thermocouple Intended for Thermoelectric Generators Using Low-Cost Nontoxic Materials"

L.K. Narangammana, Y.M.D.C.Y., Bandara, L.A. DeSilva, T.M.W.J. Bandara

KNOW YOUR HOME

Department Floor Plan



Administration

Old Bui	Iding : First Floor
P 209	: Physics Head's Office
P 208	(081-229-4581) Administrative Office
P 207	: Copier Room
P 204	: Main Stores
New Bu	ilding : First Floor
UX 22	: Archive Room

Staff Common Rooms

Old Bui	ding : First Floor
P 210E	: Physics Library
P 206	: TA (Demonstrator's) Room
New Bu	ilding : First Floor
U 2	: Academic Common Room
New Bu	ilding : Ground Floor
G 9	: Non-Academic -

Common Room

Common Spaces

Old Bu	ilding
PC 1	: Physics Lower Lobby
PC 2	: Physics upper Lobby
PC 3	: Physics Office Lobby
New B	uilding
PC 4	: New Ground Fl. Lobby
PC 5	: New First Fl. Lobby
	: Washrooms

Lecture Theaters/Rooms

na Rnii	aing : Ground Floor	
104	: Physics Lower Theater	
Id Buil	ding : First Floor	
203	: Physics Upper Theater	

- PA 1 : Interactive Learning Room P 216 : Audio Visual Studio
- New Building : First Floor U 16 : P-1 Theater
- U 21 : P-2 Theater U 19 : P-3 Theater UX 25 : Smart Room
- UX 27 : Discussion Room UX 14 : Conference/Seminar Room
- (081-239-4625) : Physics Education Room (081-239-4625) U1

Research Labs

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Old Buil	ding : Ground Floor
P 105	: Semiconductor (SC) R. Lab
P 110	: Research Equipment Room
P 111	: Advanced Material - Research Lab (AMReL)
P 112	(081-239-4384) Ceramics R. Lab
P 113	: Solid State Ionics (SSI) - R. Lab (081-239-4582)
P 119	: Nuclear R. Lab 🌚
P 106	: Undergraduate R. Lab

hing Labs	
ding : Ground Floor	
: Mechanics T. Lab	Lab-1
(081-239-4589) : Advanced T. Lab (081-239-4588)	Lab-3
ding : First Floor	
: Astronomy &	Lab-9
Atmospheric I. Lab	Lab 3
: Optics I. Lab :	Lap-Z
: Computer T. Lab	Lab-4
ilding : Ground Floor	
: Nuclear T. Lab 😵	Lab-8
: Electricity T. Lab	Lab-7
: Electronics T. Lab	Lab-5
: Heat & Thermodynamic	s Lab-6
T. Lab (081-239-4620) op : Ground & First Floors	
: Machine Shop	
: Woodwork Shop	
: Safety Items Room	
: Glass Blowing Shop	
: Drafting/Lecture Room	
: Workshop Stores	
A Malalina Chan	
	hing Labs ding : Ground Floor : Mechanics T. Lab (081-238-4388) : Advanced T. Lab (081-238-4388) ding : First Floor : Astronomy & Atmospheric T. Lab : Optics T. Lab : (081-238-4383) : Computer T. Lab : (081-238-4383) : Computer T. Lab : (081-238-4383) : Nuclear T. Lab : (081-238-4383) : Electricity T. Lab : Electronics T. Lab : Actine Shop : Woodwork Shop : Safety Items Room : Glass Blowing Shop : Drafting/Lecture Room : Workshop Stores

[081-239-4592]

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New Bu	iding : First Floor
U 3	: Dr. Kapila. B. Wijayaratne
U4	: Prof. Wijendra J. Bandara
U 5	: Dr. Varuni A. Seneviratne
U 6	: Dr. C. S. Perera
U7	: Dr. B.M.K. Pemasiri
U 8	: Dr. Lahiru K. Narangammana
U 9	: Prof. Pubudu Samarasekara
U 10	: Dr. V. Sivakumar
U 11	: Dr. Thiloshana P. Ranawaka
U 12	: Dr. Rachitha Mendis
U 13	: Dr. Prasanna Liyanage
Old Buil	ding : Ground Floor
P 108	: Dr. Buddhika S. Dassanayake
Old Buil	ding : First Floor
P210A	: Dr. E. N. Jayaweera
P 210B	: Dr. Nilushi L. Dassanayake
P 210C	: Prof. Kalinga Bandara
P 213	: Dr. P.W.S.K. Bandaranayake
P 214	: Dr. Chandana P. Jayalath
P 215	[007.522.4323]

Facilities

LECTURE THEATERS



The Department of Physics has several lecture theatres that are equipped with modern amenities to facilitate an effective learning experience for students. These lecture theatres include Physics Upper (PU), Physics Lower (PL), P1, P2, and P3. The Physics Upper (PU) Theatre is a spacious lecture theatre located on the upper floor of the physics old building. It has a high students. The Physics capacity of Lower (PL) Theatre is located on the ground floor of the Physics old building. Both theatres are equipped with modern audiovisual equipment.

P1, P2, and P3 theatres are located in the upper floor of the Physics New Building. They are all equipped with audiovisual equipment and have a comfortable seating arrangement for students. All lecture theatres in the department are shared among other departments for lectures and examinations.

TEACHING LABS



The Department of Physics boasts of several well-equipped teaching labs that are designed to provide students with hands-on training in various areas of physics. These labs include Elementary Lab, Optics Lab. Electricity Lab, Heat and Thermodynamics Lab, Sound Lab, Electronics Lab, Nuclear Lab, Advanced Lab, and Computer Lab.

All labs in the department are equipped with modern equipment and are staffed by well-trained technical officers and experienced lab instructors who provide students with hands-on training and guidance. The labs are designed to facilitate learning, student centered collaborative learning, and teamwork conduct among students to experiments, collect data, analyze data, and draw conclusions.

STUDENT CENTERED LEARNING



The Department of Physics is committed to promoting a studentcentered learning environment where students are actively engaged in the learning process. To support this goal, the department provides various spaces for students to work collaboratively, discuss concepts, and engage in independent study.

The discussion room, seminar room, and student study room (215) are designed to promote collaboration and discussion among students. The discussion room provides a comfortable space for students to work together on problem sets or discuss concepts covered in class.

The smart room is another feature of the Department of Physics that supports student-centered learning. It is equipped with state-of-the-art technology that enables instructors to deliver dynamic and interactive lectures.

RESEARCH LABS



The Department of Physics is committed to promoting cutting-edge research in various areas of physics. To support this goal, the department has several well-equipped research labs that enable faculty members and graduate students to conduct innovative research in their respective areas of expertise.

The Solid-State Ionics Laboratory is designated for research in solid-state ionics and focuses on developing new materials for energy storage. The Ceramics Laboratory is focused on the synthesis and characterization of advanced ceramic materials for various applications. The Advanced Materials Research Laboratory (AMReL) is a state-of-the-art research facility that focuses on the synthesis, characterization, and applications of advanced materials. The Semiconductor Laboratory is focused on the synthesis and characterization of semiconductor materials for various applications. The radiation Physics Laboratory mainly focuses on medical radiation utilized for diagnosis and treatment. It links the professionals in the field of Radiology and Medical Physics to protect the patients, workers and public from unnecessary radiation exposures.

RESEARCH EQUIPMENTS



The Department of Physics is equipped with a variety of research instruments to support scientific inquiry and discovery. Some of the instruments available include X-ray Fluorescence Spectroscopy (XRF), Complex Impedance Analyzer, Neutron Activation Analyzer, Radiation survey meter, and Polarization Microscope.

Overall, the Department of Physics has a range of research instruments available to support research in a variety of fields. These instruments enable researchers to explore the properties of materials and phenomena at a microscopic level, and to make important discoveries in fields such as environmental science, materials science, and nuclear engineering.

WORKSHOP





The Department of Physics also has a mechanical workshop that provides technical support for researchers and students. This workshop is open to all departments at the university, and has a variety of equipment available, including a lathe machine, drill press, and milling machine.

In addition to the technical equipment, the workshop also has a separate carpentry section, equipped with tools and materials for working with wood.

Overall, the workshop at the Department of Physics provides important support for researchers and students across a variety of departments.

Contact Us



Acknowledgements

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For further information

[1] Student handbook 2020/2021 Faculty of science, University of Peradeniya

(https://sci.pdn.ac.lk/docs/Student-Handbook-2020-2021.pdf)

[2] Department of Physics, University of Peradeniya Website (https://sci.pdn.ac.lk/physics/)

[3] Faculty of science, University of Peradeniya Website (https://sci.pdn.ac.lk/)