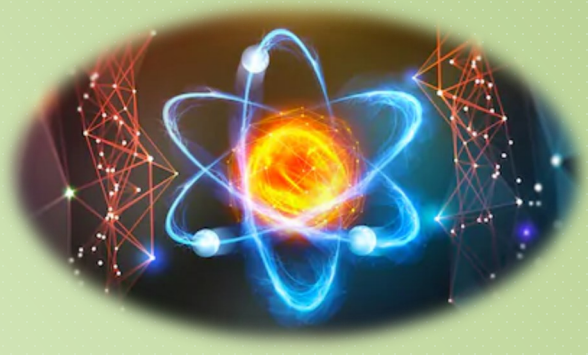
XXXIV ANNUAL IAPT CONVENTION-2019
NATIONAL SEMINAR
On
RECENT ADVANCES & INNOVATIONS IN PHYSICS TEACHING & RESEARCH (RAIPTR-2019)

October 13-15, 2019

Souvenir & Abstracts

(Pre-Conference Proceedings)



Organized By

DEPARTMENT OF APPLIED SCIENCES,
INDIAN INSTITUTE OF INFORMATION TECHNOLOGY ALLAHABAD,
PRAYAGRAJ-211015, U.P., INDIA

XXXIV ANNUAL IAPT CONVENTION-2019
NATIONAL SEMINAR
On
RECENT ADVANCES & INNOVATIONS IN PHYSICS TEACHING & RESEARCH (RAIPTR-2019)

October 13-15,2019

Souvenir & Abstracts

(Pre-Conference Proceedings)

Chief Editors: Dr. Akhilesh Tiwari, Associate Professor, Applied Sciences, IIIT Allahabad
Dr. Pramod Kumar, Associate Professor, Applied Sciences, IIIT Allahabad
Dr. Srijit Bhattacharjee, Assistant Professor, Applied Sciences, IIIT Allahabad

Co-Editors: Mr. Shailesh Kumar, Research Scholar, Applied Sciences, IIIT Allahabad
Mr. Sanjay Sharma, Research Scholar, Applied Sciences, IIIT Allahabad

Editorial Board: Dr. Sanjai Singh, Associate Professor, Dept. of ECE, IIIT Allahabad
Dr. Anil Kumar Singh, Associate Professor,
Dr. Animesh Kr. Ojha, Associate Professor, Dept. of Physics, MNNIT Allahabad
Dr. Naresh Kumar, Associate Professor, Dept. of Physics, MNNIT Allahabad
Dr. Sanjay Sharma, Associate Professor, Dept. of Physics, DBS College, Kanpur

Organized by

DEPARTMENT OF APPLIED SCIENCES,
INDIAN INSTITUTE OF INFORMATION TECHNOLOGY ALLAHABAD,
PRAYAGRAJ, UTTAR PRADESH, INDIA

Chief Patron	: Prof. P. Nagabhushan, Director, IIIT-Allahabad
Patron	: Prof. Vijay A. Singh, President, IAPT
Organizing Chairs	: Prof. U S Tiwari, Dean (HA), IIIT-Allahabad Prof. T Lahiri, Dean (A & R), IIIT Allahabad Prof. Shekhar Verma, Dean (IRP), IIIT Allahabad

NATIONAL ADVISORY COMMITTEE

Prof. R.N. Kapoor, Founder member IAPT, Ex. HoD, Dept. of Physics, VSSD College, Kanpur
Prof. Shiv Gopal Mishra, Vigyan Parishad, Prayagraj
Prof. U.S. Kushwaha, Chief editor, IAPT, Bulletin, Chandigarh
Prof. H.C. Pradhan, Immediate Past President, IAPT, Mumbai
Prof. K.N. Joshipura, General Secretary, IAPT, Anand (Gujarat)
Prof. Bhupati Chakraborti, Immediate Past General Secretary, IAPT, Kolkata
Prof. H. C. Verma, IIT Kanpur
Prof. S. L. Srivastava, Univeristy of Allahabad, Prayagraj
Prof. Ram Kumar, IIT Kanpur
Prof. Harshawardhan Wanare, IIT Kanpur
Prof. S. Anantha Ramakrishna, IIT Kanpur
Prof. K.V. Srivastva, IIT Kanpur
Prof. B.N. Dwivedi, IIT(BHU)
Prof. K. Sethupathi, IIT Madras
Prof. M. K. Harbola (IIT Kanpur)
Prof. D. Bahadur, IIT Mumbai
Prof. Krishnacharya, IIT Kanpur
Prof. Ashok Pandey, Distinguished Scientist, CSIR-IITR, Lucknow
Prof. Mushahi Husain, Ex. VC, Rohilkhand University
Prof. Sanjay Singh, IIT(BHU)
Prof. Bishwaroop Mukhopadhyay, Harishchanrda Research Institute, Prayagraj
Prof. Hari Prakash, University of Allahabad
Prof. A K Rai, University of Allahabad
Prof. V K Tiwari, University of Allahabad
Prof. D P Jayapandian, SHUATS Allahabad
Prof. Chandan Upadhyay, IIT(BHU)
Prof. B. P. Tyagi, DBS College, Deheradun
Dr. Sanjay Kumar Sharma, Secretary, IAPT, DBS College Kanpur
Dr. D C Gupta, Treasurer, IAPT, DBS College Kanpur
Dr. R K Dwivedi, President, IAPT, RC-4, Christ Church College, Kanpur
Dr. Sundar Singh, Secretary, IAPT, RC-4, Bareilly College, Bareilly
Prof. A.P. Srivastva, Treasurer, IAPT, RC-4, DBS College Kanpur
Dr. Pragya Agarwal, DBS College Kanpur
Dr. Manoj Johari, DAV College Kanpur
Dr. Manoj Mishra, DAV College Kanpur
Dr. Manish Kapoor, Christ Church College, Kanpur

LOCAL ORGANIZING COMMITTEE

Prof. Krishna Misra, Dept. of Applied Sciences, IIIT Allahabad
Prof. Tapobrata Lahiri, Dept. of Applied Sciences, IIIT Allahabad
Dr. Pritish Vardwaj, Dept. of Applied Sciences, IIIT Allahabad
Dr. Ashutosh Mishra, Dept. of Applied Sciences, IIIT Allahabad
Dr. Sanjai Singh, Dept. of ECE, IIIT Allahabad
Dr. Nidhi Mishra, Dept. of Applied Sciences, IIIT Allahabad
Dr. Amit Prabhaker, Dept. of Applied Sciences, IIIT Allahabad
Dr. Sangeeta Singh, Dept. of Applied Sciences, IIIT Allahabad
Dr. Ratan Kumar Saha, Dept. of Applied Sciences, IIIT Allahabad
Dr. Amaresh Kumar Sahoo, Dept. of Applied Sciences, IIIT Allahabad
Dr. Abdullah Bin Abu Baker, Dept. of Applied Sciences, IIIT Allahabad
Dr. Sintu Kumar Samanta, Dept. of Applied Sciences, IIIT Allahabad
Dr. Sumit Kumar Upadhyay, Dept. of Applied Sciences, IIIT Allahabad
Dr. Anand Kumar Tiwari, Dept. of Applied Sciences, IIIT Allahabad
Dr. Vrijendra Singh,HoD, Dept. of Information Technology, IIIT Allahabad
Dr. Manish Goswami, HoD, Dept. of ECE, IIIT Allahabad
Dr. Vijayshree Tewari, HoD, Dept. of MS, IIIT Allahabad
Dr. Anil K Singh, EC Member,IAPT RC-4, ECC Allahabad
Prof. S N Pandey,Department of Physics, MNNIT Allahabad
Dr. Animesh Ojha,HoD Department of Physics, MNNIT Allahabad
Dr. Naresh Kumar,Department of Physics, MNNIT Allahabad
Dr. R K Singh,Department of ECE, IIIT Allahabad
Dr. S K Singh,Department of Information Technology, IIIT Allahabad
Dr. P K Dubey, Central EC Member, RC-09, MP
Mr. Ajay K Tiwari, Technical Officer, IIIT Allahabad
Mr. Prashant K Srivsatava, Technical Superintendent, IIIT Allahabad

ORGANIZERS

Convener	:	Dr. Akhilesh Tiwari, IIIT-A Associate Professor (Physics)
Coordinator	:	Dr. Pramod Kumar, IIIT-A Associate Professor (Physics)
Co-Coordinator	:	Dr. Srijit Bhattacharjee, IIIT-A Assistant Professor (Physics)
Helping-Desk	:	Faizan Ahmad, Dinesh Kumar, Ankit Singh, Shivani Saini, Ankur Gupta, Shailesh Kumar, Sanjay Sharma, Gyanendra Kr. Maurya, Vidhu Agarwal, Surendra Kumar

PROGRAM OVERVIEW

TIME SCHEDULE

DATE: 12.10.2019 (SATURDAY)
DAY 'ZERO'

TIME	PROGRAM Venue: Senate Hall, Admin Building
09:00 am - 11:30 am	**National IAPT Executive Committee Meeting**
11:30 am - 12:00 pm	**High Tea**
12:00 pm - 01:00 pm	**National IAPT Executive Committee Meeting**
01:00 pm - 02:30 pm	**Lunch**
02:30 pm - 04:15 pm	**National IAPT Executive Committee Meeting**
04:15 pm - 04:30 pm	**Tea**
04:30 pm - 06:00 pm	**National IAPT Executive Committee Meeting**

Two National Competitions

02:00 pm - 05:00 pm (5503, CC-3)	NCICP (National Competition on Innovation in Computer for Physics) **Coordinator - Prof. P.D. Lele, Ahmedabad**
02:00 pm - 05:00 pm (5018, CC-3)	NCIEP (National Competition for Innovative Experiments in Physics) **Coordinator - Prof. Rekha Ghorpade, Mumbai**
06:00 pm—7:00 pm (Main Auditorium)	**Cultural Evening** **Sitar** and **Sarod 'Jugalbandi'** by **Amit** and **Asit Goswami**

DATE: 13.10.2019 (SUNDAY)
DAY 1

Inaugural Session
Venue: Main Auditorium

TIME	PROGRAM	
10:00 am – 10:10 am	Saraswati-Vandana, Lighting of Lamp, Floral Welcome of Dignitaries and Guests	
10:10 am – 10:15 am	Introduction to the Program	Convener, IAPT
10:15 am – 10:25 am	Welcome Address by **Director, IIIT- Allahabad**	**Prof. P. Nagabhushan**, Hon'ble Director IIIT-Allahabad
10:25 am – 10:30 am	About IAPT Activities	**Dr. K.N. Joshipura**, General Secretary, IAPT
10:30 am – 10:35 am	Introduction to IAPT Convention	**Prof. Vijay A. Singh**, IAPT President
10:35 am – 10:45 am	NGPE Awards by **the Chief Guest**	**Prof. B.P. Tyagi** NSE & NGPE Chief Coordinator
10:45 am – 10:50 am	IAPT - Dinbandhu Sahu Memorial Award by **the Chief Guest**	Prof. Vijay A Singh
10:50 am –11:00 am	Felicitation by **the Chief Guest** of **1. Prof. Shiv Gopal Mishra (PM, Vigyan Parishad, Allahabad)** **2. Prof. R N Kapoor (IAPT Veteran)**	Prof. Vijay A. Singh
11:00 am – 11:05 am	Release of "Pragami Tarang" Magazine & Souvenir of RAIPTR-2019 by **the Chief Guest**	Dr. Tushar C. Pandya, from RC-7
11:05 am – 11:20 am	Address By **the Chief Guest**	Hon'ble Padma Vibhushan **Prof. M. M. Joshi**
11:20 am – 11:25 am	Vote of Thanks	Organizing Secretary
11:25 am – 12:00 Noon	**High Tea & Group Photo Session**	

***** Registrations will be scheduled from 8:30 am to 10:00 am at Auditorium's lawn**

DATE: 13.10.2019 (SUNDAY)
DAY 1

Academic Session 1

Chair-1: Prof. U. S. Kushwaha Chair-2: Prof. R. Balakrishnan

Venue: Main Auditorium

TIME	PROGRAM	
12:00 pm – 12:30 pm	**D P Khandelwal Memorial Lecture-1** Invited Talk & Book Inaugural by President IAPT	Prof. P.C. Deshmukh (IIT-Tirupati) "**Get the most from the least whether classical or quantum mechanics**"
12:30 pm – 01:00 pm	**D P Khandelwal Memorial Lecture-2** Keynote Speaker's Talk on IAPT Exams	Prof. B. P. Tyagi
01:00 pm – 01:15 pm	IAPT Dinbandhu Sahu Memorial Award **(Dr. Punita Verma)** Speech	Coordinated by Prof. K. N. Joshipura
01:15 pm – 02:30 pm	**Lunch**	

Academic Session 1-A

Chair-1: Prof. B. P. Tyagi Chair-2: Prof. P. Venkataramaih

Venue: Admin Auditorium

02:30 pm – 03:00 pm	Prof. K. N. Joshipura	Invited Talk (Lunar and planetary mission investigations: Physics plays the fundamental role)
03:00 pm – 03:30 pm	**Oral Presentation**	**Oral Talk 1-3 (See Section #1)**
03:30 pm – 04:00 pm	**Tea Break**	
04:00 pm – 06:00 pm	IAPT Annual General Body Meeting (AGM)	

Oral Talk Section #1

TIME	Presenter	Topic
03:00 pm – 03:10 pm	Thakur Prasad Yadav	Experimental demonstration: A visualize process for Physics teaching
03:10 pm – 03:20 pm	Jyoti Bhardwaj	Video Based Demonstration of Constructing 3-D Bravais Lattices
03:20 pm – 03:30 pm	Dr. R. Balakrishnan	Girls in Physics - Gender equality or inequality

DATE: 14.10.2019 (MONDAY)
DAY 2

TIME	PROGRAM	
07:30 am – 09:00 am	Breakfast with Tea	
Innovations in Physics Teaching & Research		
Academic Session 2 **Chair-1: Prof. B. P. Tyagi Chair-2: Dr. Rajesh Srivastava** **Venue: Admin Auditorium**		
09:00 am - 09:45 am	Prof. P. Venkataramaih	Invited Talk (Teaching Physics- How to make it attractive)
09:45 am - 10:15 am	Prof Vijay A. Singh	Keynote Speaker (Physics & the City of Mumbai)
10:15 am - 11:15 am	**Oral Paper Presentation**	**Oral Talk 4-9 (See Section #2)**
11:15 am - 11:45 am	Tea Break	
Recent Advances in Physics Teaching & Research		
Academic Session 3 **Chair-1: Prof. P. S. Yadav Chair-2: Dr. Anil Kumar Singh** **Venue: Admin Auditorium**		
11:45 am - 12:00 pm	Prof. P. C. Deshmukh	Invited Talk (Time Delay in Atomic Dynamics)
12:00 pm – 12:15 pm	Dr. Mukesh Jewariya	Invited Talk (Redefinition of International system (SI) Units)
12:15 pm - 01:25 pm	**Oral Paper Presentation**	**Oral Talk 10-16 (See Section #3)**
01:25 pm – 3:00 pm	Lunch	
Academic Session 4 **Chair-1: Prof. Vijay A. Singh Chair-2: Dr. Sanjay Sharma** **Venue: Admin Auditorium**		
03:00 pm - 03:20 pm	Dr. Shirish Pathare (HBCSE)	Invited Talk (Physics Olympiad Experimental Program)
03:20 pm - 03:40 pm	Dr. Achintya Pal	Invited Talk (Innovative method of solution to celebrated Mice Problem)
03:40 pm - 04:00 pm	Dr. Anwesh Majumdar	Invited Talk (Towards a content-based epistemic measure in physics)
04:00 pm – 06:00 pm	Poster Presentation Venue: Main Auditorium Gallery	

*****Note*****
: The posters' setup time in the Main Auditorium Gallery is scheduled during the Lunch.

DATE: 14.10.2019 (MONDAY)
DAY 2

Oral Talk Section #2

TIME	Presenter	Topic
10:15 am – 10:25 am	Dr. D. Sarala	Innovations in Physics Teaching
10:25 am – 10:35 am	Dr. L. A. Udachan	Innovative ways for Research at UG & PG Level
10:35 am – 10:45 am	Prof. Sarmistha Sahu	My Physics Teaching through Simulation
10:45 am – 10:55 am	Kalpana Awasthi	Google Classroom: Interactive Teaching and Learning
10:55 am – 11:05 am	Dr. V.S. Santhala	Online Physics Teaching and Learning
11:05 am – 11:15 am	Dr. Satendra Kumar	विज्ञान-रस (A Poetic form of Fundamental Physics)

Oral Talk Section #3

TIME	Presenter	Topic
12:15 pm – 12:25 pm	Dr. Geetha R S	Physics Experiments Using Smartphone with Sensors
12:25 pm – 12:35 pm	Dr. Amit Kumar Jana	Role of hands-on demo experiments to promote physics teaching
12:35 pm – 12:45 pm	Dr. V.K. Saraswat	Marathon Numerical Achievement Test in Physics
12:45 pm – 12:55 pm	Bhanu Mani Dixit	Effective Assessment in Higher Education
12:55 am – 01:05 am	Dr. P Nagaraju	Designing low cost Experiments at the Undergraduate-level
01:05 pm – 01:15 pm	B. Siddlingeshwar	Computational Methods for Molecular Systems
01:15 pm – 01:25 pm	D. Usharani	Analyzing skills involved in solving problems based on graphical representations

DATE: 14.10.2019 (MONDAY)
DAY 2

Poster Presentation Section

TIME	Presenter	Topic
04:00 pm – 06:00 pm	Pramod Kumar	Inverse magneto-caloric effect single crystal of Ca3Ru3O7
	D. Usharani	An Innovative Method of Laboratory Training
	Girish L. Vekaria	Physics and Living Organism Relation
	Sanjay B. Kansara	Study of human body: Innovative way of physics
	Akhilesh Kumar	ICT for Improvement of Quality of Education in India
	M. Prabhugouda	Designing Laboratory Experiments For UG And PG Levels
	Sangam Kumar	Constrained Motion Of A Cable-Connected Satellites System Under The Combined Influence Of Several Perturbative Forces
	Rajkumar Shanajaoba Singh	The Brachistochrone Problem
	Pijush Mondal	Understanding pendulum with oscillating support with help of Lagrangian mechanics
	Nishanth P Udayanandan K. M. Prasanth P	How Vibrations of a Membrane can be Made Musical?
	G. S. Menaria	Physics Of Fort- Chittorgarh
	Shivakumar Siddanna	Impact of thickness on refractive index of chromium Nano films
	Dhakane S. F. Sudhir Phakatkar	To understand the solar safari in convenient scale
	Chitralekha Alur	Analysis of trace element present in the medical plant colocasia
	Amit Saha	EPR Spectroscopy in Study of Tumors and Cancers
	Krishnakant Rana	Quantum Treating Cancer

DATE: 14.10.2019 (MONDAY)
DAY 2

Poster Presentation Section

TIME	Presenter	Topic
04:00 pm – 06:00 pm	Dr. V. Anuradha Dr. K. C. Radha Dr. S. Subhadramma	Study Of The Effect Of Soap Concentration On Surface Tension Of Water Through Laser Diffraction Methods
	Santosh Kumar Umar Ashok Kumar Mittal	Accuracy of students' self-judgement about their conceptual understanding of Electric Force and Field
	Madhumita Ghosh Dastidar	Estimation of the width of Onion Epidermal Cells using Laser Diffraction
	Amit Kumar	Study of laser-induced persistent photo-dielectric effects in Se-Te-Sn-Cd chalcogenide glassy semiconductors (STSC ChGs)
	B. P. Relekar S. B. Mane	Career Opportunities For B. Sc. Students In Sugar, Alcohol, Ethanol And Allied Industries
	Nityendra Keshav Oke	Need of history of physics integrated into classroom teaching
	Mahendra Kumar	ICT an Effective Tool for Teaching Quantum Mechanics
	O. P. Gupta D. C. Gupta	XRD study of Transition metal ions doped in $(ZrO_2)_{0.8}$ $(Y_2O_3)_{0.2}$ ceramic compound
	D. C. Gupta A. P. Srivastava O. P. Gupta	Use Of Information Technology In Physics Teaching
	D. K. Sharma	Variation of ionospheric parameters during different phase of solar activities over the low-mid latitude ionospheric region
	Harshal A. Sanghvi	Role Of Information Technology In Physics Education
	Reshma P. Nishanth P. Udayanandan K. M.	A Study of Ideal Quantum Systems Using Virial Expansion
	Prashant Singh D.V.Shukla Vijay Narayan Mishra Anoop Kumar Pandey	DFT study of Thermodynamical and NLO response of Allopurinol

DATE: 15.10.2019 (TUESDAY)
DAY 3

TIME	PROGRAM	
07:30 am – 09:00 am	Breakfast with Tea	
Advanced Ideas in Physics Teaching & Research		
Academic Session 5 **Chair-1: Prof. Sarmistha Sahu Chair-2: Prof. Manjit Kaur** **Venue: Admin Auditorium**		
09:00 am - 09:15 am	Prof. S. K. Joshi, Coordinator	NCEWP (National Competition for Essay writing in Physics) Awards
09:15 am - 09:40 am	Dr. Michael Ponnambalam	Invited Talk (Tips for Putting Fire into Your Teaching)
09:40 am - 10:40 am	**Oral Paper Presentation**	**Oral Talk 17-22 (See Section #4)**
10:40 am - 11:20 am	Tea Break	
Excellence in Teaching Physics & Research		
Academic Session 6 **Chair-1: Dr. Mukesh Jewariya Chair-2: Dr. Animesh Kr. Ojha** **Venue: Admin Auditorium**		
11:20 am - 12:30 pm	**Oral Paper Presentation**	**Oral Talk 23-29 (See Section #5)**
12:30 pm – 2:00 pm	Lunch	
Valedictory Function **Venue: Admin Auditorium**		
02:00 pm - 03:00 pm	1. Address by Prof. Vijay A. Singh, President, IAPT. 2. NAEST (National Anveshika Experimental Skill Test) awards (Prof. H.C. Verma). 3. NCICP (National Competition on Innovation in Computer for Physics) awards. 4. NCIEP (National Competition for Innovative Experiments in Physics) awards. 5. Remarks by Convener, IAPT Convention XXXIV. 6. Chairman's Remarks. 7. Vote of thanks by General Chair & Secretary, RC-04, IAPT.	
03:00 pm	High Tea	

*****Note*****

: A parallel session for Physics Experiments will run from 9:00 am to 12:30 pm in the Main Auditorium on 15-10-2019.

DATE: 15.10.2019 (TUESDAY)
DAY 3

Oral Talk Section #4

TIME	Presenter	Topic
09:40 am – 09:50 am	Vandita Srivastava	Retention Rates for Masters & Ph.D. Programmes and Role of ICT and UGR in Physics Education
09:50 am – 10:00 am	Prasanth P	Equipartition Theorem for Periodic to Chaotic Oscillators
10:00 am – 10:10 am	Abhijit Poddar	Integrating simulations in topic-specific Learning Management Systems in Electronics
10:10 am – 10:20 am	R.M. Shewale	Evaluation methods at college level
10:20 am – 10:30 am	Sarbajit Dutta	Waveform Analysis of the Bouncing Ball Problem
10:30 am – 10:40 am	D. N. Bhosale	Use of Blended Learning and Mobile Learning for Imparting Instructions in Physics at Under Graduate Level

Oral Talk Section #5

11:20 am – 11:30 am	Dr. Namrata Chandel	Dielectric Relaxation & Thermally Activated A.C. Conduction in third generation multi-component glasses
11:30 am – 11:40 am	Dr. Swatantra Kumar Gupta	Modelling of Translucent Concrete using Optical Fibers
11:40 am – 11:50 am	K. Subramanian	Some Visualizations in Quantum Physics
11:50 am – 12:00 pm	Girish Vekaria	Physics principles: The heart of athletics
12:00 pm – 12:10 pm	Abhijit P Sarode	Role of Physics teacher in effective teaching in Colleges and Universities
12:10 pm – 12:20 pm	M S Jogad	Pb-Silicate Neutron Diffraction data from Dhruva Reactor Experiment- Structure factor Correlation of atoms as an assignment
12:20 pm – 12:30 pm	Anil K Singh	Quantifying critical thinking in the teaching of Physics "Gendered action in the first-year students"

Parallel Experimental Session

By Prof. H. C. Verma

Venue: Main Auditorium

TIME	PROGRAM
09:00 am - 09:30 am	Experimental Exhibition and Demonstration
09:30 am – 10:30 am	Inside Story of the Rutherford Experiment
10:30 am - 11:00 am	Tea **Break**
11:00 am – 12:00 am	Learning Physics from Simple Experiments
12:00 pm – 12:30 pm	**Question and Answer Session**

MESSAGES

डि. प्रशांत कुमार रेड्डी, भा.प्रशा.से.
D. Prasanth Kumar Reddy, IAS

भारत के उप-राष्ट्रपति के निजी सचिव
PRIVATE SECRETARY
TO THE VICE-PRESIDENT OF INDIA
नई दिल्ली/NEW DELHI - 110011
TEL.: 23016344 / 23016422 FAX : 23018124

MESSAGE

The Hon'ble Vice President of India is happy to know that the Department of Applied Sciences, Indian Institute of Information Technology (IIIT), Allahabad in association with Indian Association of Physics Teachers (IAPT), is organizing its Annual Convention 2019 and National Seminar on Recent Advances & Innovations in Physics Teaching & Research (RAIPTR-19) from October 13 – 15, 2019 at IIIT, Allahabad, Uttar Pradesh.

The Hon'ble Vice President extends his greetings and congratulations to the organizers and participants and wishes the event all success.

(D. Prasanth Kumar Reddy)

New Delhi
6th September, 2019.

Dr Murli Manohar Joshi
Former National President, Bharatiya Janata Party
Padma Vibhushan Awardee

MESSAGE

I am happy to know that Indian Association of Physics Teachers (IAPT) is organizing the 34th Annual IAPT Convention & National Seminar on ***Recent Advances & Innovations in Physics Teaching and Research (RAIPTR-2019)*** during 13-15 October 2019 at the Department of Applied Sciences, IIIT Allahabad, Prayagraj. It gives me immense pleasure that this activity is being organized at IIIT Allahabad, Prayagraj, both the city and the Institute are very near to me.

I feel that the message of Innovation in Physics teaching will be spread out with this kind of activity IAPT involved in for a long time. I am looking forward to an excellent meeting with reputed scientists from all over India and I believe that it will bring more collaboration and interaction opportunities among the teachers of Physics which will have great implication for future. Science is simple because it seeks truth and reality. Truth is always simple, when a theory it leads to complications, it has then reached or is about to reach its limits.

I am also happy to know that a Souvenir for the RAIPTR-2019 is also being published on that occasion. I do believe that the Souvenir would serve as a reference for the Scientists from all over India.

I wish all success to this Conference and also to the Souvenir.

(Murli Manohar Joshi)

New Delhi;
October 7, 2019

Former Union Minister Govt. of India : • Home Affairs • Human Resource Development • Science & Technology • Ocean Development
Former Chairman : • Public Accounts Committee • Estimates Committee

Raisina Road, New Delhi - 110001 Tel. : (011) 23718444, 23326080 Fax : (011) 23711772 email : murli@sansad.nic.in

भारतीय सूचना प्रौद्योगिकी संस्थान, इलाहाबाद
Indian Institute of Information Technology, Allahabad
(An Institution of National Importance Established by the Act of the Parliament of India)

प्रो0 पी. नागभूषण
Prof. P. Nagabhushan
B.E., M.Tech., Ph.D., F.I.E., F.I.E.T.E.

निदेशक
DIRECTOR

Message from the Director, IIIT Allahabad, Prayagraj

I am very much delighted to welcome you all to the XXXIV ANNUAL Indian Association of Physics Teachers (IAPT) CONVENTION 2019 at Indian Institute of Information Technology Allahabad, Prayagraj. I understand that IAPT was established in the year 1984 and since then it is the torch-bearer for Physics teachers in all academic level. Scientific education in today's world is extremely important to solve the world's problems like pollution and global warming, that threaten our existence. As a science teacher, you work to transfer your enthusiasm to the young mind; you work to eradicate superstitions and to make students rational thinker. There is no greater pleasure for a teacher when you see those young students resonate with your love and enthusiasm for the subject.

I am confident that the way Physics is taught to these young minds by great teachers like you, the students inculcate that learning happens to be a great experience which leads one to become creative, and equally I am sure that teachers also understand that teaching Physics is not just for getting the students prepared for the customary class examinations.

I hope this conference will serve as a platform to share your knowledge, enthusiasm and methods to evoke the scientific curiosity in students' mind. I wish this conference a grand success and paved the future of physics teaching in India. I am very positive that the future generation would be more and more scientific in all aspects of life.

26/9/19

P.Nagabhushan
Prof. P. Nagabhushan
Director
Indian Institute of Information Technology
Allahabad-211015 (U.P.)

Deoghat, Jhalwa, (NCR) Subedarganj, Allahabad–211015, U.P. INDIA, Ph: + 91-532-2922222, 2922027, 2922004 (O), 2922512-13 (R)
Email: director@iiita.ac.in, pnagabhushan@iiita.ac.in, pnagabhushan@hotmail.com, Web: www.iiita.ac.in, Fax: + 91-532-2922125

Prof. Dr. Klaus von Klitzing
Max-Planck-Institut FKF
Heisenbergstrasse 1
D-70569 Stuttgart

TEL +49-711-689 1570
FAX +49-711-689 1572
EMAIL K.Klitzing@fkf.mpg.de
WWW www.fkf.mpg.de/klitzing

Message

The Indian Association of Physics Teachers (IAPT) was established in the year 1984, just one year before I received the Nobel Prize in physics. Winning the Nobel Prize is considered to be the highest honor one could receive in one's scientific career, but I always remember the role played by my teachers behind this success. Science education is extremely important to solve the problems in the world and to fight against false claims. Luckily, my teachers for mathematics and physics got me excited about science and shaped my mind to become passionately curious about the nature around. I am sure that all the physics teachers participating this convention feel proud when they successfully explain fascinating aspects of nature to their students. It is important to imbibe the culture of passionate teaching among the teachers through such meetings.

I wish the 34th Annual IAPT Convention & RAIPTR- 2019 every success.

Klaus v. Klitzing

JAWAHARLAL NEHRU CENTRE FOR ADVANCED SCIENTIFIC RESEARCH
(A Deemed University)

JAKKUR CAMPUS, JAKKUR P.O.
BANGALORE - 560 064, INDIA

Professor C.N.R. RAO, F.R.S
National Research Professor
and
Honorary President

August 28, 2019

MESSAGE

I am delighted that under aegis of the Indian Association of Physics Teachers (IAPT), the Department of Applied Sciences, Indian Institute of Information Technology Allahabad, is organizing the XXXIV Annual IAPT Convention 2019 & National Seminar on Recent Advances & Innovations in Physics Teaching & Research (RAIPTR-19) to be held on 13-15 October 2019 at IIIT Allahabad, U.P., Prayagraj.

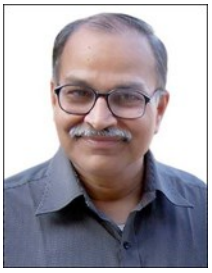
I note that the conference aims to deliberate innovations in physics teaching and physics education research as also provide use of information technology, online teaching and learning, teaching through simulation for research for UG and PG students. The effort of IAPT is commendable as it is important to propagate designing laboratory experiments at different levels, teaching physics through assignments, deliberating on evaluation methods at school and college levels, teaching history of physics integrated into classroom teaching and to pay special attention to the underprivileged.

I wish the conference success.

C N R Rao
Linus Pauling Research Professor

Phone : Off: 91-80-23653075, 22082761 □ Res: 91-80-23601410 □ Fax : 91-80-22082760, 22082766, 23602468

H C Verma
www.hcverma.in
Ex-Professor of Physics
IIT Kanpur



Message

It gives me immense pleasure that 34th Annual IAPT Convention & National Seminar on Recent Advances & Innovations in Physics Teaching & Research (RAIPTR-2019), is being organized by the Department of Applied Sciences at Indian Institute of Information Technology Allahabad. As I am deeply associated with IAPT activities, and being a Physics teacher, I am much delighted to have another fascinating experience with the young as well as veteran minds of Physics from all over the India.

I wish the program a great success and a very good luck to the organizing team.

H C Verma

प्रोफ के । सेतुपति
Prof. K. Sethupathi
प्रोफेसर और अध्यक्ष
Professor & Head

भौतिकी विभाग
Department of Physics
आई.आई.टी मद्रास, चेन्नै 600 036, भारत
I.I.T. Madras, Chennai 600 036, India

दिनांक/Date: 18.09.2019

MESSAGE

It gives me immense pleasure to know that the 34th Indian Association of Physics Teachers Annual Convention and National Seminar on Recent Advances and Innovations in Physics Teaching and Research (RAIPTR-19) is being organized by the Department of Applied Sciences, Indian Institute of Information Technology (IIIT) Allahabad, from 13-15 October, 2019.

As you all know, Physics is the fundamental subject that drives the understanding of the world around us and is the basis for all technological advancements made so far. Thus, it becomes pertinent to ensure that this knowledge and passion is passed on to the upcoming generations.

There is a need to improve pedagogy in the physics field and make it relevant and exciting for the modern-day students to learn, which I believe this seminar addresses in its various themes. My hope is that this platform is used to share and enhance the collective knowledge and ideas to bring out the best in each student through the teaching methodologies.

I wish the organizers all success in their laudable efforts. I am sure the forthcoming seminar will add to the list of their successful ventures in the service to the society.

K. Sethupathi

दूरभाष / Ph: 2257 4850 (O); 4851 (HoD) ; ईमेल / Email: phhead@iitm.ac.in; ksethu@iitm.ac.in

भौतिक अनुसंधान प्रयोगशाला
(भारत सरकार, अंतरिक्ष विभाग की यूनिट)
नवरंगपुरा, अहमदाबाद - 380009, भारत

Physical Research Laboratory
(A Unit of Dept. of Space, Govt. of India)
Navrangpura, Ahmedabad 380009, India

डॉ. अनिल भारद्वाज, एफएनए, एफएएससी, एफएनएएससी
Dr. Anil Bhardwaj, FNA, FASc, FNASc
निदेशक / Director

September 20, 2019

MESSAGE

It gives me great pleasure to learn about the XXXIV IAPT Annual Convention and National Seminar on recent Advances & innovations in Physics Teaching & Research (RAIPTR) 2019 being organized by the Department of Applied Sciences, IIIT Allahabad, India, in association with the IAPT RC-4 during October, 2019.The culture of influential guidance and collaborative work with young minds is what a teacher, scientists and researchers needs to imbibe and this necessitates to remain updated with the recent advances in physics teaching and training globally. This was the style of science leadership of our beloved scientist Dr. Vikram Sarabhai whose birth centenary is being celebrated this year.

I hope the seminar, along with the special sessions will greatly benefit the young teachers, scientists, researchers and, students and help them understand the current advances made in science and technology.

I wish the XXXIV Annual IAPT Convention 2019 a grand success.

ABhardwaj 20/9/2019

डॉ. अनिल भारद्वाज
Dr. Anil Bhardwaj
निदेशक / Director

ई-मेल/E-mail: abhardwaj@prl.res.in / bhardwaj_SPL@yahoo.com फोन/Phone: +91-79-26314855 फैक्स/Fax: +91-79-26300374

INDIAN INSTITUTE OF TECHNOLOGY BOMBAY
Mumbai- 400076, India

Dr. K. G. SURESH
Professor and Head
Department of Physics
FAX : 91-22-25723480
Email : suresh@phy.iitb.ac.in
Phone : 91-22-25767559

Message

I am very happy to know that the Indian Association of Physics Teachers is organizing the 34th Annual IAPT Convention 2019 & National Seminar on Recent Advances & Innovations in Physics Teaching and Research during 13-15 October 2019 at IIIT Allahabad. I feel that this is a very important activity that IAPT has been doing and today its importance is much more than before. With the availability of sophisticated experimental and computational tools, many breakthroughs are happening in Physics and related areas. Similarly, barriers between Physics and other sciences and even engineering branches are disappearing rather fast. Therefore, it is very important that Physics students and teachers are up-to-date with these developments. Furthermore, in the rush for publish or perish, one should not underestimate the importance of high quality Physics teaching. I am sure that events of this kind will send across such message and help in identifying bright scientists and engineers.

I wish this convention a great success.

With regards

[K. G. SURESH]

प्रो. श्री निवास सिंह
कुलपति
Prof. S. N. Singh
FIEEE, FNAE, FIET, FIE(I), FIETE
Vice-Chancellor

मदन मोहन मालवीय प्रौद्योगिकी विश्वविद्यालय
Madan Mohan Malaviya University of Technology
गोरखपुर–273 010 (उ.प्र.) भारत
Gorakhpur-273 010 (U.P.) India
(Formerly : Madan Mohan Malaviya Engineering College, Gorakhpur)
(Estd. 1962)

Message

I am delighted to know that Department of Applied Science, IIIT Allahabad in association with IPAT RC-4 is organizing the "34th IPAT Annual Convention and National Seminar on RAIPTR 2019" during 13-15 October,2019 and publishing a souvenir/proceeding of the convention. The objective and theme of convention is very useful, and I hope that this convention will provide a platform to the academicians, researchers and participating students to share their view and expertise with other participants. Being Vice-Chancellor of M.M.M. University of Technology, Gorakhpur I hope that the convention will focus on areas relevant to the recent advances and Innovation in physics teaching and research.

I sincerely believe that the convention shall provide opportunity to the seasoned researchers and young mind working in the domain to interact, discuss and deliberate to motivate research scholars and faculty members to contribute to the nation by innovative ideas in improving quality of physics teaching.

I wish this convention to be fruitful, meaningful and also a grand success!

(Prof. Sri Niwas Singh)
Vice-Chancellor

शिविर कार्यालय/Camp Office :
दूरभाष / Tele : (0551) 2273637
फैक्स / Fax : (0551) 2270012

कुलपति सचिवालय/V.C. Secretariat :
दूरभाष / Tele : (0551) 2273958
फैक्स / Fax : (0551) 2270011

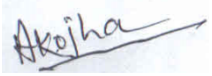
Message

Animesh Kumar Ojha

It is a matter of pride for me to welcome all the esteemed delegates, scientists, academicians, young researchers, and students from all over the India and abroad to attend the XXXIV Annual IAPT Convention-2019 & National Seminar on Recent Advanced in Physics Teaching and Research (RAIPTR-2019) to be held on October 13-15, 2019 organized by Department of Applied Sciences, IIIT Allahabad, India. As per the theme of the IAPT convention combined with national seminar, it will cover global aspects of advancement in physics teaching and research from very fundamental to practical applications and shed more light to recent research and cutting edge technologies, which gains immense interest to young and brilliant researchers, and talented student communities. The goal of organizing this convention is to bring together, a group of scientists, researchers, students and engineers working on different aspects of the physics and their applications to present and exchange their break-through ideas and unique results relating to the advance research in physics. This convention will encourage the advance research in different branches of physics and technological development for applications in the different fields of science and technology, in particular and welfare of the society, in general.

I am looking forward to an excellent meeting with great scientists from all over the India and abroad and I am sure that it will bring more collaboration and interaction opportunities among the scientists which will have great implication for future.

I congratulate organizers for organizing such a wonderful event and wish them a grand success.



Animesh Kumar Ojha
Head, Department of Physics
Motilal Nehru National Institute of Technology Allahabad
Prayagraj-211004

Message

I am very happy to be associated with the XXXIVth annual Convention of the Indian Association of Physics Teachers, being organized at IIIT Allahabad-Prayagraj, during October 13-15, 2019. In keeping with the IAPT traditions, a national Seminar on *Recent Advances and innovations in Physics teaching & research is* also being held together with the Convention. The annual Convention is a Flagship activity of IAPT, and it provides a good opportunity to the delegates for exchange of ideas and information on various aspects of Physics Education. The Convention draws a big interest also since the poster/ oral competitions are organized, and the annual prizes for competitions (NCEWP, NCIEP, NCICP) and the gold-medals to students along with the best teacher Award are presented during the three day event. Invited Talks and oral presentations add to the attraction with the inclusion of demo and hands-on experiments, but no less importance can be given to poster sessions, which prove to be more interactive. Quite important are the offline informal sessions during the breaks, in which people continue the discussions further. The Central EC meeting and the Annual General Body meeting are also an integral part of the IAPT Convention. The Convention is an occasion to plan out the activities and programmes of the IAPT for the coming year. The need of the hour in our country is a better Science education in general and Physics education in particular. Our IAPT will be more visible if we put more efforts in that direction.

As regards the Convention, I am happy to also note that the Organizers have asked for a two-page paper/Ms from the participants, and selected presentations will be considered for the Proceedings to be printed.

I congratulate and offer my best wishes to the Convener Dr. Akhilesh Tiwari, his team and his institution, for the Convention being held at IIIT Allahabad-Prayagraj. With interest and enthusiasm from the delegates from all over India, it will be, I am sure, a memorable event in the years to come.

Prof. K. N. Joshipura
(Former Professor & Head, Department of Physics, Sardar Patel University,
Vallabh Vidyanagar – Gujarat)
General Secretary, Indian Association of Physics Teachers

Prof. Vijay A Singh

President, Indian Association of Physics Teachers
Centre for Excellence in Basic Sciences, Mumbai University (Feb 2015 - present)
Professor - HBCSE-TIFR (2004 - Jan 2015); IIT Kanpur (1984-2004);
ex-National Coordinator: Science Olympiads and The National Initiative on UG Science

Message

I am most pleased that the 34th Annual Convention of the Indian Association of Physics Teachers is being organized at IIIT and in the historic city of Prayagraj.

This year marks the centenary of Prof. Meghnad Saha's discovery of the Ionization formula named after him. Prof. Saha spent many memorable years at the University of Allahabad. It is also the centenary year of Dr. Vikram Sarabhai, the father of the Indian Space Program. It is befitting that the convention is being held in the State of Uttar Pradesh where the IAPT was born some 35 years ago.

The IAPT respectfully celebrates the 150th birth anniversary of the Father of the Nation, Mahatma Gandhi.

I commend the initiative taken by our young colleagues in IIIT in holding this event. The IAPT wishes them and the people of Prayagraj the very best.

Vijay A. Singh

Dr. Akhilesh Tiwari
Senior Member IEEE
Associate Professor (Physics) & Head, First Year B.Tech.
Department of Applied Sciences
Indian Institute of Information Technology Allahabad
Deoghat, Jhalwa, Allahabad - 211012, U.P., INDIA
Ph. +91-532-292 2244 (O), 2684 (R) +91-9450141862 (Mob)
E-mails: akhilesh.tiwari77@gmail.com, atiwari@iiita.ac.in

Message

It gives me immense pleasure that Indian Association of Physics Teachers (IAPT) has given us this opportunity to organize the 34th IAPT Annual Convention & National Seminar on Recent Advances and Innovation in Physics Teaching and Research (RAIPTR-2019). I am feeling very honored to welcome the Physics fraternity of the country at the Department of Applied Science, Indian Institute of Information Technology Allahabad in the holy city of Prayagraj. From college days, I was fortunate that my home was very near to the IAPT, Kanpur office. And I was involved with the activities of IAPT without knowing the greatness of this association since 1999, and got opportunity to work with the pioneers of IAPT. Now, after twenty years, I am welcoming you all in IIITA campus, which is a great moment for me. We are grateful to all the participants, speakers and all who helped us in organizing the 34th IAPT Annual Convention & RAIPTR-2019. I wish that with their kind support this convention will be a great success.

Once more, I would like to thank all those who helped us, the dignitaries, participants and my organizing committee members for their whole hearted support.

Akhilesh Tiwari

Convener, 34th IAPT Annual Convention & RAIPTR-2019

INVITED TALKS

INVITED SPEAKERS

Physics and The City of Mumbai

Prof. Vijay A. Singh
Centre for Excellence in Basic Sciences, Mumbai
Email: physics.sutra@gmail.com

Abstract

The megapolis of Mumbai (erstwhile Bombay) is a meeting pot amalgamating a large number of cultures; it is a commercial and entertainment epicenter where grist and grime share space with shining structures. A typical *Mumbaikar* uses the municipal (BMC) water, commutes to work in an overcrowded local train or the public (BEST) bus and seeks relief in the evening by visiting the seashore, etc. While such everyday occurrences have at times inspired writers and poets, one would hardly suspect that they would catch the eye of a discerning physicist. We discuss in this presentation the (simple) physics of everyday occurrences in "*Aamchi Mumbai*".

Teaching Physics- How to make it attractive

P Venkataramaih , Mysore

Abstract

Physics is a wonderful subject in Science and the methods of its teaching vary from level to level. At lower levels devising innovative gadgets help to explain the concepts and phenomena. At the UG and PG levels teaching Physics based on any text book can be made more interesting by coupling historical aspects in the development of the topic to motivate the learners and make them develop interest in the phenomena. This aspect is explained in the talk by taking a few specific examples in the growth of Physics. some of the examples discussed are: Accidental discovery of X-Rays by Roentgen, Discovery of Radioactivity by Henri Becquerel, Discovery of Neutron by James Chadwick, Nuclear Fission by Hahn and Strassman, Development of Nuclear reactor for peaceful uses, Development of "Atomic Bomb" in America. Nuclear-Fission by Hahn and Strassman, Development of Nuclear reactor for peaceful uses, Development of "Atomic Bomb" in America. The testing of the Nuclear Explosion in a desert in New Mexico before two powerful bombs were detonated on Hiroshima and Nagasaki in Japan by America. Finally the importance of Video lectures available on NPTEL, EDX and TED talks will also be highlighted.

Redefinition of International system (SI) Units

Mukesh Jewariya

CSIR-National Physical Laboratory-New Delhi
Jewariya.mukesh@nplindia.org

Abstract

International System (SI) of Units is at the heart of science of measurements and its applications and technology. All measurements require some specific units to express the results of their measurements related to quantity, value, amount etc.. The International System of Units (SI) provides a widely used coherent framework of units. The present SI unit system is fit for purpose for all measurements, but it has several shortcomings. Most notably, the kilogram is defined via an artifact that limits its realization to a specific place and certain times. To solve this problem and to take advantage of advances in quantum metrology made in the last 50 years, a revision of the SI is planned. The General Conference on Weights and Measures (Conférence Générale des Poidset Mesures, CGPM) was met on 13–16 November 2018 in Versailles, France. At this meeting, a vote on a proposal to revise the SI units was scheduled. The majority of member nation are in favour of the revision, the new SI was came into effect on 20 May 2019. The revision of the SI units planned to take effect in 2019 fundamentally changes the definition of four units: the kilogram, the ampere, the kelvin, and the mole with all other fundamental units of measurements. Now all the seven SI units definition are based on fundamental constants. This revision will modify the foundation of the SI from base units to fundamental constants of nature. While the revision presents a huge shift in philosophy, the size of the units will not change, and hence the revision will go mostly unnoticed.

Get the Most from the Least - whether Classical or Quantum

P. C. Deshmukh

Department of Physics, IIT-Tirupati
pcd@iittp.ac.in

Abstract

This talk begins by asking what the fundamental question in mechanics is, whether classical, or quantum. I will discuss how this question is answered in (Galileo-) Newtonian formulation which employs the principle of causality and determinism, and in the Lagrangian, and Hamiltonian mechanics, which dispenses with the cause-effect relationship and uses, instead, the principle of least action. I shall then discuss how the same question is answered in de Broglie – Schrodinger formulation of quantum mechanics, and in the alternative method of Heisenberg, Born and Jordan. In the last part of my talk, I shall discuss how the variational principle provides a fundamental alternative basis for the Dirac-Feynman's path integral approach to quantum mechanics.

Time Delay in Atomic Dynamics

P. C. Deshmukh

Department of Physics, IIT-Tirupati
pcd@iittp.ac.in

Abstract

Einstein's insightful analysis of the symmetry in the laws of electrodynamics changed our perception of space and time in a manner that continues to challenge common intuition. Even as time is not an observable, and perhaps not comprehensible, time-intervals are measurable. Physical atomic processes occur at ultra-fast speeds over attoseconds. In this talk, I shall introduce the Wigner-Eisenbud-Smith (WES) measure of time delay in atomic dynamics. Exploiting the time-reversal symmetry, the WES time-delay is well-adapted to estimate the time-delay in the atomic photoelectric effect. Einstein's explanation of photoionization laid the very foundation of the quantum theory. For over a hundred years, it was considered to be an 'instantaneous' process, but in the last decade, there have been pioneering studies, both experimental and theoretical, in which photoionization time-delays on the attosecond time scale have been reported. These are of importance for the atomic-clock technology, and to understand fundamental relativistic effects and many-body electron-correlations in atomic dynamics. This research field is very young, yet quite vast. I shall provide a brief introduction to this exciting field and discuss our understanding of the photoionization WES time-delay, and its anisotropic character, especially in the energy regions of the Cooper-minimum, and also in the energy regions of autoionization resonances, and the shape resonances.

Tips for Putting Fire into Your Teaching

Michael Ponnambalam

Physics Department, University of the West Indies, Kingston 7, Jamaica
michael.ponnambalam@uwimona.edu.jm

Abstract

In many countries, physics has earned the sad reputation of being hard and boring. This happens because of the way it is communicated to the students by teachers who are poorly trained in communication skills. With the help of teaching and research experience in five continents over four decades, this paper presents useful ideas on how to turn the presentation of physics into an intellectual ice cream, and the physics class into an ice cream parlour!

Keywords—Physics education research, physics popularization, communication skills

Physics Olympiad Experimental Program

Shirish Pathare, HBCSE, Mumbai

Abstract

Physics olympiad activity is running in the country for almost 20 years now. One of the striking difference from any other competition in the country is its experimental component. Given the difficulty level of the competitions at the International olympiads, the training of the Indian teams demands experimental development of the equivalent level. In my talk, I will glance through different experiments developed for training as well as testing the Indian olympiad students. I will also talk about various teacher involvement programs around the physics olympiad activity. Lastly, I will give an idea about the contribution of physics olympiad experimental program in undergraduate education.

Towards a content-based epistemic measure in physics

Anwesh Mazumdar
anwesh@tifr.res.in

Abstract

We elaborate on a new approach of assessing content-based epistemic clarity of college physics students in terms of their ability to discriminate between different epistemic warrants for propositions in a chained argument in physics. A threefold classification (nominal, physical and mathematical) of warrants is used, with each class split into a number of distinct epistemic categories. The assessment tool, which consists of a questionnaire, is illustrated for a standard undergraduate physics derivation. It is tested for reliability, internal consistency and construct validity. Correlation of content knowledge, ascertained independently, with epistemic clarity is investigated. Data on a large and diverse sample of physics undergraduates is presented. We discuss a variety of epistemic pitfalls revealed by the data, some of which are common among all groups of students, and some that are good discriminators. The proposed approach is complementary to the standard concept based tests and has pedagogic potential to evaluate as well as to promote critical understanding of college level physics.

Innovative method of solution to celebrated Mice Problem

Achintya Pal
(e-mail: babulan@gmail.com)

Abstract

In mathematics, the mice problem is a celebrated one in which a number of mice (or beetles, dogs, missiles, etc.) are placed at the corners of a regular polygon. In this problem, *n* mice start at the corners of a regular *n* sided polygon of side length *a*, each always heading towards its closest neighboring mouse in a counter-clockwise direction at constant speed *v*. The questions posed are: What is the distance covered by each mouse? When and where the mice meet? What is the trajectory traced out by each?

ORAL PRESENTATIONS

RAIPTR-O1

Experimental demonstration: A visualize process for physics teaching

T.P. Yadav
Hydrogen Energy Centre, Department of Physics, Institute of Science,
Banaras Hindu University, Varanasi- 221 005, India
E-mail: yadavtp@gmail.com

Abstract

The physics is an interesting subject of science and it can be demonstrated easily by theoretically and experimentally depending upon teaching-learning experiences. However, it is expected that only class room teaching of the physics would discourage the tradition of studying the content of the subject matter. Many open ended experimental activities included with a view that the student-teacher can dwell on them and then try to perform them by sharing their views with others can enhance the learning ability of the student . This will also enable students to develop various skills such as communication, team spirit, respect for other's ideas, inquiry and self-reflection. In recent years, a number of factors have prompted change in the teaching of physics including technology based teaching and online learning. However, laboratory demonstration in physics is the essential part. Importance of the laboratory demonstration will be discussed, including a greater focus on conceptual understanding and the cognitive skills required to understand and apply physics concepts, interactive engagement methods, teaching physics in different contexts, and the use of technology.

RAIPTR-O2

Connecting Physics Ideas: An Innovative Method of Instruction

D. Usharani[1*], K. M. Raghavendran[2] and S. Manu[3]
1,2,3 Department of Physics, M.E.S. College of Arts, Commerce and Science, Bengaluru (India)
*E-mail: ushadasiga@yahoo.co.in

Abstract

Physics teaching in the present day scenario is primarily focussed on content delivery by the teacher which often fails to make any tangible impact on learning. Connecting ideas of similar physical phenomena is challenging for students. Primary goal of physics education is to enable students to construct knowledge which is not fragmented and disconnected. In this paper, we propose a framework for an innovative method of teaching physics which enables students connect ideas related to physical phenomena that are governed by similar mathematical connotations. Keywords- conceptual understanding, equations, integration

RAIPTR-O3

150 years of the Periodic Table – highlights

R. Balakrishnan, retired professor of physics, Bangalore 560076
Email: balakilatha@gmail.com

Abstract

2019 is named the International Year of the Periodic Table of chemical elements by the UNESCO. Periodic table is a versatile tool which gives the past, present and future of the physical and chemical nature of both the natural and manmade elements. Antoine Lavoisier in 1789 first published the list of 33 elements. Today, it has 118 elements from Hydrogen (At.No.1) to Ogenesson(At,No.118), with spaces in between for further discovery. A brief history of this development is given in this paper. The periodic table is arranged into families (vertical columns) of elements with similar physical and chemical properties. In addition, it also gives trends about atomic radius, ionization energy, electro negativity, reactivity and the metallic and non metallic nature of elements in a lucid and simple way. Several variations deviating from the original matrix form (rows and columns) of the original format to different shapes are being attempted. Some also highlight the unknown uses of several uncommon elements in the tiny squares of the tables with the usual data. These will be given in a Power point presentation followed by a short popular video on the history of the periodic table.

RAIPTR-O4

Innovations in Physics Teaching

Dr.D.Sarala
Head, Department of Physics & Electronics
St.Ann's college for Women
Mehdipatnam,Hyderabad-500028.
Email: saralatvs@gmail.com

Abstract

Teaching of Physics at Undergraduate level has been an ever interesting phase of transition from fundamentals to frontier research fields. The primary goal of every Physics teacher is to motivate and inspire to become researcher and a scientist. With the paradigm shift in the educational system, more emphasis is laid on learner centric approach, it is imperative to seek alternative and better method of instruction delivery, instruction design so that the learners have a smooth sail of learning. Some of the Digital Technologies like - Simulations, Flipped class rooms, Blended learning, Online teaching , Video lectures, Google class Rooms have aided in better comprehension for the learners . It also helps them to visualize the abstract concepts in a more clear way. In this present paper , some of the techniques that have been used by me in teaching B.Sc students has been explained.

Keywords: Simulations, Flipped class rooms, Blended learning, Online teaching , Video lectures, Google class Rooms,Graph plotting using Excell Sheets.

RAIPTR-O5

Innovative Ways for research at UG and PG levels

Udachan L. A [a*], Shiva L. U [b], Chitralekha.Alur [c], Shrishail S Kolkundi [d], Shivakumar Siddanna [e], Nagesh S Kolkundi [f]
[a] S. S. Tegnoor Degree College, Kalaburagi-585105, Karnataka, India. [b] Dept of Physics, Rani Channamma University, Belagavi, Karnataka, India. [c] Dept of Physics, S.B. College of Science, Kalaburagi, Karnataka, India. [d] Government First Grade College, Shahapur-585 223, Dist : Yadgir, Karnataka, India. e Dept of Physics, Kuvempu University, Shimoga, Karnataka, India.
[f] Gulbarga University-585 105, Kalaburagi, Karnataka, India.
*Corresponding author : ulingappa@gmail.com.

Abstract

Research is an organized and systematic study of materials and sources in order to discover and to analyze new things and establish facts and draw new conclusions. It is a systematic process to achieve new knowledge, science or invention by the use of standard methods as well as scientific inquiry. The objectives of the paper are to find out the nature of attitude of students towards research in higher studies and the differences of attitude towards research among different strata. Undergraduate research has grown to levels of sophistication today. Virtually, every university that is active in research has grown to understand the importance of research to be inculcated from the early days. A bridge the gap between class-room education and real world challenges, and learning the relevance of the curriculum that they undergo at the Institute, internalize take ownership of the process of learning and education. Thus, undergraduate research is seen as a vehicle to bring about a change in the approach of addressing the holistic development of undergraduate students at this Institute. It offers valuable experiences and benefits to all sections of the academic environment - students.

RAIPTR-O6

Evaluation methods at college level

Dr R. M. Shewale
Jai Hind Edl.Trust's Z. B. Patil College, Dhule
Affiliated to K. B. C. N. M. Univ. Jalgaon
E-mail: drrmshewale@gmail.com

Abstract

Few techniques of evaluation of the college students are discussed. Like brainstorming, concept of map, decision making, minute paper and multiple choice questions.

Keywords - brainstorming, concept of map, decision making, minute paper multiple choice questions.

RAIPTR-O7

Google Classroom: Interactive Teaching and Learning Tool

Kalpana Awasthi
K.N. Govt. P.G. College, Gyanpur, Bhadohi-221304, U.P.
*E-mail: awasthi.k@gmail.com

Abstract

Teaching includes two major components sending and receiving information. The teacher tries his best to impart knowledge as the way he understood it. Any communication methods that focus on this purpose without disturbing the objective could be considered as interactive methods of teaching. As the world is being developed with the new technologies, discovering and manipulating new ideas and concepts of online education are changing rapidly. There are several blended learning methods which can take many forms, depending on the teachers and students involved. The most of the blended learning is organized using cooperative learning. In this context, Google classroom is an effective tool for educating the students and improving their learning. This article outlines the advantages of recent trends in organization of Google classroom in the educational institution.

RAIPTR-O8

विज्ञान-रस (A Poetic form of Fundamental Physics)

Author: Satendra Kumar,
Indian Institute of Information Technology Una
E-mail: satendrak@iiitu.ac.in

Abstract

In this article, the translation of fundamental laws of Physics in the form of Hindi-Urdu poetry will be presented. Author believes that there is always *fun* in the *fun*damental concepts of science. In the view of same, Newton's laws of motion, Newton's gravitational law, law of reflection, Bernoulli's theorem, Photoelectric effect, Doppler effect, Raman effect, Seebeck effect, Zeeman effect, conservation of energy, conservation of momentum, conservation of angular momentum and many more concepts have been included in this version.

RAIPTR-O9

My Physics teaching through Simulation

Sarmistha Sahu, Associate Prof. Physics (Retired), Maharani Laksmi Ammanni College (Autonomous).
sarmistha.sahu@gmail.com

Abstract

Physics concepts can best be introduced by simulation when the parameters are unpredictable. I have used 'spreadsheet simulation' in my class teaching with excellent outcome. It is a platform for representing simulation models and perform simulation experiments. Quantum ideas itself talk of probability density of existence of a particle, its momentum spread in a quanta and the uncertainity, both in position and momentum. This can be best studied in the simulation platform. Few examples that has been done in our classroom are quantum harmonic oscillator, quantum tunneling, radioactivity, stimulated emission and absorption in lasers and determination of irrational fraction 22/7 using Monte Carlo Simulation to satisfy undergraduate students in a classroom.

RAIPTR-O10

Analyzing skills involved in solving problems based on graphical representations

D.Usharani[1*], B N Meera[2†]
1 Department of Physics, MES College of Arts, Commerce and Science, Bengaluru-560003, 2 Department of Physics, Bangalore University, Bengaluru-560056, *E-mail: ushadasiga@yahoo.co.in
† bnmeera@gmail.com

Abstract

Graph is one of the multiple representations used widely to supplement understanding in physics learning and in addition corroborate what is previously known. Students often do not activate math elements and tools effectively in problem solution-methods. Identifying skills and subskills is essential for developing graphicacy among students to be successful in physics problem –solving.

RAIPTR-O11

Physics Experiments Using Smartphone With Sensors

Dr Geetha R S
Vijaya College, RV Road, Basavanagudi, Bengaluru-560098
*E-mail: gitars61@gmail.com

Abstract

Technology plays an important role in which we learn and teach. In the last few years ICT based learning techniques like open online courses and mobile learning are catching up. Among their benefits, these two technologies ease the access to knowledge. In physics teaching, smartphones and tablets can be used not only as knowledge facilitators, but also as powerful experimental tools as they are coming with many sensors as add on features: accelerometer, gyroscope, magnetometer, sound, light, ... Students can use their own smartphones either in laboratories or in convenient locations. Experiments with smartphones can be easily performed in non-traditional places as playgrounds, travel facilities, home among many others.

RAIPTR-O12

Effective Assessment in Higher Education

B.M. Dixit, Lalit Kr. Shukla and R.G. Singh
Institute of Natural Sciences and Humanities, Shri Ramswaroop Memorial University, Barabanki 225003, UP, India

Abstract

In early 80‘s a report is published in US titled “A Nation at Risk: The Imperative for Educational Reform” wherein the highlighting point was Americans' poor academic performance as against overseas students, high levels of functional illiteracy among U.S. adults and more alarming was the educational skills of one generation would not surpass, nor would they even equal, those of its predecessors. Similarly, in late 80‘s UK brought ―Education Reform Act 1988‖ wherein a National Curriculum was designed to teach certain subjects and their syllabi with Standard Assessment Tests (SATS) and General Certificate of Secondary Education (GCSE) Exam.

RAIPTR-O13

Designing low cost Experiments at the Undergraduate-level

Nagaraju P
Department of Physics, Indian Academy Degree College(Autonomous)
Hennur Cross, Bengaluru 560 043
Email: godhundi60@gmail.com

Abstract

We all know that laboratory work is important and basic for all science subjects in general and physics in particular. Undergraduate education contributes significantly for the development of one's own career and the nation building. In general, we have the habit of repeating the same old experiment and the same old method. Thinking of a new experiment or changing the method of performing an experiment is a challenge to both the teachers and students. Designing and conducting experiments by procuring the required apparatus, analyzing and interpreting data, revising, trouble shooting of the Experiments and communicating the results to students is a great experience. Undergraduate Physics experiments are not responsive to societal expectations in most of the Colleges in Karnataka. This may be due to the gross enrolment ratio (GRE) and absence of student orientation. The results n poor infrastructure and funding for maintaining and updating labs is lacking. The traditional physics curriculum is made up of labs, lectures and computational work. In many Colleges, students are still doing some Volve experiments (Tetrode, Pentode, etc), Rigid pendulum, Torsional pendulum, X-Ray photograph analysis (using the photocopy of the photograph taken some 20 years ago - Debye-Scherer method). There is stagnation in what is offered! This is not only due to the financial hindrance but also due to the negligence from our part. Hence, the need of the hour is to design some new experiments or to change the method of doing the experiment at an affordable cost.

RAIPTR-O14

Computational Methods for Molecular Systems

B Siddlingeshwar*
Department of Physics, M S Ramaiah Institute of Technology, Bengaluru-560054, India
*E-mail: sidduphysics@gmail.com

Abstract

Generally, quantum chemical calculations are useful in handling the electronic states of molecular system. The photophysical properties of 3-(N'-phenyl) piperazino-7H-benzo [de]anthracen-7-one (Ph-PBA) are reported in gas phase and solvent environment. In the present investigation we present ground state and excited state dipole moments, absorption and emission maxima (nm) along with other quantum chemical parameters obtained using B3LYP/6-311+ G(d,p) basis set in gas phase and in solvent environment. The solvent effect on ground state dipole moment is not so significant. On excitation of the solute molecule, there is a large increase in the dipole moment in solvent media. Further the studies indicate that there is shift of electron density from phenyl substituted piperazine part to the benzanthrone core of molecule in HOMO to LUMO transition.

RAIPTR-O15

Girls in Physics–Gender Equality or Inequality

1. N. Manju, Department of Physics, Meenakshi College for Women, Chennai 600024
2. R. Balakrishnan, retired professor of physics, Bangalore, 560076*
Email: 1 manjureghukumar@gmail.com 2. balakilatha@gmail.com

Abstract

Gender diversity in Physics is crucial from a social justice point of view. Though diversity is natural and important all over the world, attempts are made to minimise this. An analysis is made in this paper, taking into account the reality of gender differences. The issues for the existing poor gender ratio is identified and possible solutions are suggested. It looks an overall combined effort from the girls and parents first and from the teachers and employers are needed next to minimise the gender bias not only in physics but other fields too, But can nature be conquered fully?

RAIPTR-O16

Retention Rates for Masters & Ph.D. Programmes and Role of ICT and UGR in Physics Education

Vandita Srivastava
Kanahiya Lal D.A.V. (P.G.) College, Roorkee- 247 667
*E-mail: vandita61@gmail.com

Abstract

Retention rates (%) of students for physics, chemistry and mathematics in Ph.D., M.Phil. and M.Sc. programmes in India are evaluated and their comparison shows the highest retention percentage for Ph.D. in Physics among the three subjects. It can further be increased by the use ICT in physics education. In the present scenario, research has been included as a part of undergraduate curriculum. The possible effects of increasing application of ICT and the research at UG level is also discussed in this paper.

RAIPTR-O17

Integrating simulations in topic-specific Learning Management Systems in Electronics

Dr. Abhijit Poddar,
Dept. of Electronic Science Surendranath, Evening College, Kolkata, India 700009
Monali Poddar
Dept. of Computer Science, Maharaja Manindra Chandra College, Kolkata India 700003
abhipod@gmail.com, monsar123@gmail.com

Abstract

Small Learning Management Systems (LMS) have been created to facilitate the teaching and learning of select topics in Electronics. Carefully researched simulations have been integrated to the LMS to make the understanding of pertinent theoretical and experimental topics easier for the student. Efficacy of the simulations has also been studied and important inferences have been drawn.

RAIPTR-O18

Equipartition Theorem for Periodic to Chaotic Oscillators

Prasanth P.[1], Nishanth P.[2] and Udayanandan K. M.[3*]
1 Department of Physics, Govt. Engineering College, Thrissur - 680 009, India.
2 School of Pure and Applied Physics, Kannur University, Kannur - 670 327, India.
3 Department of Physics, Nehru Arts and Science College, Kanhangad - 671 314, India.
*E-mail: udayanandan@gmail.com

Abstract

Equipartition theorem [EPT] is generally applied for quadratic Hamiltonian. Here we apply equipartition theorem to non linear systems taking Diffing oscillator is gradually modified into a chaotic oscillator. We hope this paper will help the students to have a more understanding on EPT.

RAIPTR-O19

Use of Blended Learning and Mobile Learing for Imparting Instructions in Physics at Uunder Graduate Level

Dr. D. N. Bhosale*
Yashwantrao Chanvan Warana Mahavidyalaya, Warananagar - 416 113 (M.S.) India
Shivaji University Kolhapur
*E-mail: dr.dnbhosale@gmail.com

Abstract

Mobile learning can be efficiently used to accelerate to pace of understanding and support traditional teaching learning process. Blended learning involves listening of video lectures podcasts by the best of brains in the relevant disciplines. The traditional chalk and talk method could be made more effective, if we could incorporate blended learning. An attempt has been made to teach topics from Quantum Mechanics to B.Sc. III students of our college using blended learning and mobile learning approach. B.Sc. III Physics students (30) from our college were divided into control group (15) and experimental group (15) for this purpose. Pretest was administered to test prior knowledge control group students were taught by traditional chalk and talk method. The experimental group students were taught with mobile learning, Whatsapp, You Tub Videos, NPTEL lectures, Pod cast. Post test was conducted on both the group for testing concept attainment. Analysis of post test scores showed that experimental group student scored much higher (30% to 90%) than control group students. This indicates blended learning and mobile learning has lead to deeper understanding and concept attainment of the students from experimental group.

RAIPTR-O20

Dielectric Relaxation & Thermally Activated A.C. Conduction in third generation multi-component glasses

Namrata Chandel[a] and Neeraj Mehta [b]

[a]Department of Physics, Sunbeam College for Women, Varanasi-221005, India
[b]Glass Science Laboratory, Department of Physics, Banaras Hindu University, Varanasi-221005, India.

Abstract

The dielectric relaxation and thermally assisted a.c. conduction play an major role in understanding the conduction mechanism in non-oxide glasses. These two phenomena are often the deciding factors of the suitability of non-oxide glasses for particular device applications. Dielectric relaxation studies are important to understand the nature and origin of dielectric losses, which, in effect, may be useful in the determination of structure and defects in solids. The study of thermally assisted a.c. conduction can be used as a tool to understand the nature of defect states and the estimation of their density of defect states. In this presentation, therefore, we have studied the metal-induced effects of cadmium (Cd), indium (In) and antimony (Sb) on dielectric relaxation and thermally activated a.c. conduction in ternary $Se_{80}Te_{18}Sn_2$ glass. The density of charged defect states in quaternary $Se_{80}Te_8Sn_2M_{10}$ (M = Cd, In, Sb) alloys is found to vary with the electro-negativity difference of the foreign element M and Te.

RAIPTR-O21

Modeling of Translucent Concrete using Optical Fibers

Mohd. Salman Ahmad[1], S. K. Gupta[2*] and Suman Joshi[3]
1,2,3Rajshree Institute of Management & Technology, Bareilly- 243 122, UP, INDIA
*E-mail: skg.mjpru@gmail.com

Abstract

We present modeling of a concrete specimen by reinforcing optical fibers with different percentage. We have tested compressive strength and light transmission test. The compressive strength results obtained for the specimen with optical fibers depends on the volumetric part of the optical fiber introduced in the specimen.

RAIPTR-O22

Visualizations in Quantum Physics

K Subramanian (L.M: 1090)
Retd. Professor of Physics, #304 Grihalakshmi Apts, South End Road, Basavangudi, Bangalore-560 004
E-mail: ksbvaj@yahoo.com

Abstract

First Visualization - Blackbody Radiation and Quantum Physics

Rayleigh-Jean formula for the spectrum of radiation from a blackbody at two temperatures namely 1500K and 2000K is used in LabVIEW environment to obtain visualization of graph between Spectral Energy Density and Frequency depicting Ultraviolet Catastrophe discrepancy. This failure of Classical Physics led Max Planck to the discovery that radiation is emitted in quanta thereby introducing Quantum Physics. No more Ultraviolet Catastrophe is viewed after applying Planck's formula for the spectral energy density of blackbody radiation. For all computations MATLAB programs are written and they are executed in LabVIEW environment to obtain visualization which will give exposure to both MATLAB and Lab-VIEW software packages.

Second Visualization - Particle in a box

The simplest quantum-mechanical problem is chosen as that of a particle trapped in a box with infinitely hard walls. Computation of this problem shows how boundary conditions and normalization determine wave functions. The normalized wave functions together with the probability densities of the particle confined in a box with rigid walls are plotted as second visualization using LabVIEW environment. For this also, MATLAB programs, for computations, are written and they are executed in LabVIEW environment to obtain visualization.

RAIPTR-O23

Physics principles: The heart of athletics

Sanjay B. Kansara[1], Girish L.Vekaria[2]
1 P.H.G.Art's & Science College Kalol (N.G), 2 Sir P T Science College, Modasa
Sankansara35@yahoo.in

Abstract

Physics is not only relevant to the "big questions" of the universe come from and how it works, it has much real life application too. Sport is just one of them, and with this being an exciting summer of sport. Physics play a dominant role in the way athletes perform and way the sports is played. To understand how physics is applied to sporting situations, you need an understanding of basic laws and terms of physics such as motion, resistance, momentum and friction play a part in most sporting events. The physics of sports has broad applications and is useful for boosting performance in a variety of athletic disciplines. In this article we discuss the physics of various sports, for example all ball sports are governed by the physics associated with aerodynamics and fluid flow. In addition this articles also useful to student to understanding of basic physics using simple estimate.

RAIPTR-O24

Role of Physics teacher in effective teaching in Colleges and Universities

Abhijit P. Sarode
Associate Professor and Head, Department of Physics,
Dr. A. G. D. Bendale Girls College, Jalgaon 425001, India
abhijitsarode@yahoo.com

Abstract

In last two decades, considerable interest has been focused on various ways to achieve effective teaching and learning of Physics. In all phases of Physics Education, student achievement correlates with the quality of the Physics teacher. Actually what the student does is more important in determining what is learned, than what the Physics teacher does. This paper provides a comprehensive presentation of all important factors related with role of a Physics teacher for effective teaching in Colleges and Universities.

RAIPTR-O25

Waveform Analysis of the Bouncing Ball Problem

Sarbajit Dutta*, Sounak Sengupta and Subhankar Ghosh
St. Xavier's College, Kolkata sarbajitdutta.sd@gmail.com

Abstract

The behavior of a bouncing metallic ball on a horizontal table was investigated . The sound created due to the bounces was recorded and analyzed using an audio software. The values of coefficient of restitution and acceleration due to gravity were calculated. A wavepacket formation due to each of the bounces was observed where Doppler's Effect and associated calculations was used to justify the experimental observations.

RAIPTR-O26

Video Based Demonstration of Constructing 3-D Bravais Lattices

Central Theme: Innovations in Physics Teaching and Physics Education Research
Subtheme: Innovative Methods for Teaching Physics
Jyoti Bhardwaj*, OSKS Sastri & Vandana Sharda
Central University of Himachal Pradesh, Temporary Academic Block, Shahpur, India
*E-mail: rdscholarphysics2012@gmail.com

Abstract

We present video based demonstrations for constructing 3-D Bravais lattices, which is a crucial and fundamental concept of solid state physics.Using ZOOM TOOL KIT, ball stick models have been made and by stacking 2-D ones 3-D lattices have been built. The technique of stacking has incorporated variations in the parameters associated with the lattices. Students usually struggle to memorize the names and nomenclature of these structures from the standard texts. The activity aims at engaging students while making them understand that amongst so many possible 3-D crystal structures, only 14 are the ones which are unique and thus acceptable.The target students comprise of school students and undergraduate students and thus the concept of 3-D symmetries has not been included.

RAIPTR-O27

Pb-Silicate Neutron Diffraction data from Dhruva Reactor Experiment-Structure factor Correlation of atoms as an assignment

Dr. M S Jogad* and Dr. Rashmi Jogad
*Former Coordinator, Karnataka State Women's University, Vijayapur, Karanataka
*jogad1952@rediffmail.com

Abstract

The lead silicate glasses of compositions $xPbO(1-x)SiO_2$ where prepared using melt quench technique. Analytical grade compounds were taken as the starting materials. The thoroughly mixed and grounded charge was melted in a Pt-Rh crucible at the temperatures in the range 1200-1400 ^{0}C using an electrically furnace. The melt was held for 5 hr before pouring onto a graphite mould and annealed around 300^{0}C. Neutron diffraction studies on the sample=Pb-silicate glass done by High-Q diffractometer at the Dhruva reactor, BARC, Trombay,to understand the short range order and network connectivity. These data used as assignment to understand Structure factor Correlation of atoms in the samples and short range order and the bonding nature. The results are discussed as an assignment.

RAIPTR-O28

Quantifying critical thinking in the teaching of Physics "Gendered action in the first-year students"

Anil K Singh, Associate Professor, Prem P Singh, Assistant Professor
Department of Physics, Ewing Christian College, Allahabad -211003.
(An Autonomous Constituent P G College of Allahabad University)
(anilsingh012@rediffmail.com) +919515630904.

Abstract

The ability to make decisions based on data is a complex and vital skill in the modern world. The need for such quantitative critical thinking with its inherent uncertainties and variability occurs in many different contexts. It is an important goal of education, that goal is seldom being achieved. We argue that the key element for developing this ability is repeated practice in making decisions based on data, with feedback on those decisions. In mixed-gender pairs, male students tend to monopolize the computer, female and male students tend to share the equipment equally, and female students tend to spend more time on other activities that are not the equipment or computer, such as writing or speaking to peers. We demonstrate a structure for providing suitable practice that can be applied in any instructional setting that involves the acquisition of data and relating that data to scientific models. This study reports the results of applying that structure in an introductory physics. Students in an experimental condition were repeatedly instructed to make and act on quantitative comparisons between datasets, and between data and models. These differences between the groups were seen to persist into subsequent courses. Ultimately, we claim

RAIPTR-O29

Online Physics Teaching and Learning

Dr. Shanthala V.S.
Associate Professor, Department of Physics, The Oxford College of Science, Bangalore.
shanthalasastry@gmail.com

Abstract

Nowadays Computer has become an inseparable part of education. It has revolutionized the field of education and the method of teaching physics. The impact of computer and technology in the field of Education and Teaching is undisputable. Online teaching is one such effect which has become a hot trend now. In this report I have made an effort to explain the pro's con's of online teaching.

RAIPTR-O30

Role of hands-on demo experiments to promote physics teaching

Amit Kumar Jana*
Co-ordinator, Taxxila-IAPT Anveshika; 8/4- AL, Sector- II, Salt Lake, Kolkata-700091
*E-mail: akjana4321@gmail.com

Abstract

Demonstration experiments are one of the most important motivational factors in science teaching. Now-a-days, science learning is reduced to some equations, formulae and definitions, without connecting them to real life situation. As a result, our students and teachers find no excitement in doing science and that is already reflected in depleting scientific manpower. It is our observation that this process can be reversed by including some simple hands-on demonstration experiments in the lecture.

RAIPTR-O31

Marathon Numerical Achievement Test in Physics

(A Innovative approach for development of numerical ability and to improve learning process)

Dr. V.K. Saraswat
Kendriya Vidyalaya, Mathura Cantt. 281002, U.P. India

Abstract

Written examination is one of the important and significant tools for assessment. It does not only find the area of weakness but also improves art of writing art of taking examination and to improve learning process. Continuous assessment helps the teacher to diagnose provides feedback for both the pupil and teacher to modify future plan of action for better achievement test brings seriousness, interest, self confidence and feedback for improvement.

Poster Presentation

RAIPTR-P1

Inverse magneto-caloric effect single crystal of $Ca_3Ru_3O_7$

Rashmi Singh, Faizan Ahmad, Sanjay Sharma, Ankit Singh and Pramod Kumar*
Spintronic and Magnetic Materials Laboratory, Indian Institute of Information Technology, Allahabad 211012, India
*pkumar@iiita.ac.in

Abstract

$Ca_3Ru_2O_7$ possesses a complex magnetic structure by undergoing anti-ferromagnetic ordering at T_N = 56K and a Mott- like metal insulator transition at T_{M-I} = 48K. $Ca_3Ru_2O_7$ also features FOMT First Order Magnetic Transition and magneto-resistive transitions leading to a field induced ferromagnetic (FM) metallic phase below T_{M-I} where spins are almost fully polarized along the easy a-axis. An increase in applied field justifies this full spin polarization.

RAIPTR-P2

An Innovative Method of Laboratory Training

D Usharani∗
Department of Physics, MES Degree College of Arts, Commerce and Science, Bengaluru (India)
B. N. Meera
Department of Physics, Bangalore Unviersity, Bengaluru (India)†
∗ ushadasiga@yahoo.co.in † bnmeera@gmail.com

Abstract

One test of physics knowledge is experimentation. Training science students with the skills required for experimentation are essential. To prepare students for the task of obtaining data from an experiment, to analyse and interpret the result/s so as to build a coherent scientific idea, is an essential component of student training. In addition, design and conduct of experiments is the essence of doing science and thus laboratory training forms an important aspect of illustrating scientific methodology. However, this objective is rarely achieved in lab activities as students' experience is limited to struggling with instruments and juggling with numbers. In this paper, we have analysed student responses to a questionnaire based on concepts relevant to an experiment, subsequent to the completion of experimental procedure in the laboratory. This innovative method is directed towards achieving pedagogical objective of connecting physics concepts learnt in class room and in lab activities while the design of questionnaire, exclusively, suggests a novel data interpretation methodology. Results indicate learning gaps which would necessitate refinements in the write up of laboratory activity.

RAIPTR-P3

Variation of ionospheric parameters during different phase of solar activities over the low-mid latitude ionospheric region

D. K. Sharma[1], *, Ananna Bardhan[1], Malini Aggarwal[2]
1Department of Physics, Manav Rachna University, Faridabad (India)
2Indian Institute of Geomagnetism, New Panvel, Mumbai (India)
*jointcoe@mru.edu.in/ dksphdes@rediffmail.com

Abstract

The ionospheric parameters as measured by SROSS-C2 satellite have been studied over low latitude F2 region during low and high solar activity years. The study region encompasses over latitude at an average altitude of 500 km. The behaviour of the ionospheric parameters has been compared with estimated values of International Reference Ionosphere (IRI) model. The total ion density (Ni) increases by the factor of 102 with increase of solar activity and Ion temperature (Ti) increases during high solar activity compared to low solar activity. Ni and Ti are minima just before the sunrise. During sunrise Ti increases rapidly owing to low density of Ni. During evening sector Pre Reversal Enhancement (PRE) is evident in Ni during high solar activity and in Ti during low solar activity. Relative variation shows that IRI-2016 and SROSS-C2 Ti values are in good agreement with each other during low and high solar activity, except for nighttime of low solar activity. Ni values, as obtained from SROSS-C2 and IRI-2016 show asymmetrical behaviour during both high and low solar activity. IRI overestimates Ni values during low solar activity and underestimates during high solar activity. Further, relationship between Ni and Ti show weak /poor correlation. Correlation factor is weaker in low solar activity compared to high solar activity. The R2 values are similar during high solar activity and differ during low solar activity with IRI-2016 modelled values.

RAIPTR-P4

Physics and Living Organism Relation

Girish L.Vekaria[1] , Dr Sanjay B. Kansara[2]
1 Sir P T Science College, Modasa
2 P.H.G.Art's & Science College Kalol (N.G)
glv2008@yahoo.com

Abstract

Physics is the study of matter and the laws of nature to understand the behavior of matter and the universe. Biology is the study of living organisms. When we combine physics and biology, we learn more about biological systems on a molecular or atomic level. Since biology has its foundation in physics, it applies physical natural laws to the study of living organisms. Without space, matter, energy and time - components that make up the universe - living organisms would not exist. Physics helps explain how bats use sound waves to navigate in the dark and how wings give insects the ability to move through the air. Many flowers arrange their seeds or petals in a Fibonacci-like sequence to maximize exposure to light and nutrients. In some cases, biology helps prove physical laws and theories. This article focus for students majoring in the life science, without used the historical or philosophical aspects of physics. Rather we have tried to make clear the connection between physics and the life science.

RAIPTR-P5

Study of human body: Innovative way of Physics

Dr. Sanjay B. Kansara[1] , Girish L.Vekaria[2]
1 P.H.G. Art's & Science College Kalol (N.G)
2 Sir P T Science College, Modasa
Sankansara35@yahoo.in

Abstract

There is a long tradition of physicists and physics-based techniques making important contributions to biology and medicine. Medical physics is the application of physics principles to medicine or health care. It's basically a way of using our physics knowledge to develop tools and treatments that help humans live longer and be healthier. Physics can be found in a variety of other areas of medicine too. For Example Dynamics (mechanics) correlated with Heart motion, Elasticity and strength of materials related to Orthopedics, Fluid dynamics relation Blood flow in vascular system and Electricity correlated with all life processes, ion transfer at membranes. This article discuss the effects of physics on the medical sciences from perspective human body and its components are physical objects that can be viewed, measured and altered in ways that resemble what a physicist might do with any physical object.

RAIPTR-P6

Designing Laboratory Experiments For UG and PG Levels

Dr. M. Prabhugouda,
Associate Professor, Dept. of Physics, Vijayanagar College Hosapete 583201, Karnataka

Abstract

In this Paper two experiments described to show how one can design or encourage design of laboratory experiments for UG and PG Classes in place of conventional experiments. I explored other ways of performing the experiments in easy and at low cost. Many Colleges does not possess costly equipments and many a times even they are not required. For example to measure light absorption coefficient of solutions a small photo conductor can be used along with mille ammeter instead of spectrometer. Even it can be used for transparent solids. To find unknown concentration of sugar solution hallow prism and laser pointer are used instead of polarimeter. This method applied even for non optical active solutions also.

RAIPTR-P7

Constrained Motion of A Cable-Connected Satellites System Uunder The Combined Influence of Several Perturbative Forces

Sangam Kumar[1*], Ashish Kumar[2], Santosh Kumar[3], U. K. Srivastava[4] and J. D. Prasad[5]
1, 2, 3, 5 P. G. Department of Physics, L. S. College, B. R. A. Bihar University,
Muzaffarpur - 842001, Bihar, India.
4Department of Mathematics, R. S. S. College, Chochahan, Muzaffarpur- 844111
*email- kumarsangam.phy@gmail.com

Abstract

Condition regarding constrained motion of two satellites connected by a light, flexible, inelastic and non-conducting string under the influence of earth's magnetic field, solar radiation pressure, shadow of the earth, earth's oblateness and air resistance is discussed. Jacobian integral of motion of the system is also deduced. With the help of the integral, we have been able to obtain a sufficient condition for the constrained motion of the system. Satellites are subjected to the impacts absolutely non-elastic in nature, when the string becomes tight.

RAIPTR-P8

ICT for Improvement of Quality of Education in India

Akhilesh Kumar
Department of Physics, Govt. Girls P. G. College, Rajajipuram, Lucknow, UP, India

Abstract

Information and Communication Technology (ICT) can be used for the education sector. Education includes online, distance and part time education. There are unlimited applications of Information and Communication Technology in the real world. In this paper emphasis is given on the education field. Traditional Non- Formal education system process includes activities like admission, Personal Contact Programmes, Exam for any course in a University or Institution. In this process ICT can play an important role in all the activities by providing a lot of benefits to students, teachers, parents and Universities itself. ICT can be used for providing education to the people who are not able to come to school due to Various problems. ICT can play great role in formal and non formal forms of education. The present paper deals with the certain important issues related with the effective implementation of ICTs in all levels of education and provide suggestions to address certain challenges that would help in the implementation of ICTs in education and simultaneously increasing Quality of education.

RAIPTR-P9

DFT study of Thermodynamical and NLO response of Allopurinol

Prashant Singh[1], D.V.Shukla[2], Vijay Narayan Mishra[3], Anoop Kumar Pandey[4*]
1 Department of Physics, Rajendra College, Chapara Bihar
2 Departnment of Physics, GLA University, Mathura
3 Departnment of Physics, Ramshwaroop Memorial institute of Engineering and Management College, Lucknow, U.P.
4 Departnment of Physics, K.S.Saket P. G. College, Ayodhya Faizabad, U.P.
*Email: anooppandeyias@gmail.com

Abstract

Allopurinol is well known drug for treatment gout and certain types of kidney stones. Geometry optimization of Allopurinol were done by using combination of DFT/B3LYP method and 6-311G(d,p) basis set without any symmetry constrains. Several thermodynamical parameters like Enthalpy (H^0m), Entropy (S^0m),Heat Capacity ($C^0p.m$) are calculated by using same level theory with temperature range 100K-500K. These parameter shows good correlation with temperature. We also compute NLO response of title molecule by applying field 0.1eV-0.5eV. A good correlation (R^2=0.875) occurs in between x component of hyperpolarizibility (β_{xxx}) and applied electric field along X-direction (ε_x). The calculated hyperpolarizibility of Allopurinol is nearly four times greater than hyperpolarizibility of Urea so title molecule is better NLO product in future.

Key Word: NLO, NBO, QATIM, DFT

RAIPTR-P10

The Brachistochrone Problem

Shanajaoba Rajkumar (162220)
Saint Xavier's college, Mahapalika Marg, Mumbai.

Abstract

This article presents the problem of quickest descent, or the Brachistochrone curve, that may be solved by the calculus of variations and the Euler-Lagrange equation. The cycloid is the quickest curve and also has the property of isochronism by which Huygens improved on Galileo's pendulum

\

RAIPTR-P11

Understanding pendulum with oscillating support with help of Lagrangian mechanics

Pijush Mondal
St. Xaviers College Autonomous, Mahapalika marg, Fort, Mumbai, Maharashtra 400001
pijush.mondal.ashok@gmail.com

Abstract

Lagrangian mechanics is a reformulation of classical mechanics, introduced by the Italian-French mathematician and astronomer Joseph-Louis Lagrange in 1788. In Lagrangian mechanics, the trajectory of a system of particles is derived by solving the Lagrange equations. Pendulum is the most simple form of setup to understand a new mechanical formulation for students. In this project the author tried to understand Lagrangian mechanics and learn its application in pendulum with oscillating support. Here the author derived the equation of motion of the pendulum with oscillating support with the help of Lagrangian mechanics. Then the author compared the experimental and theoretical results.

RAIPTR-P12

How Vibrations of a Circular Membrane can be Made Musical?

Nishanth P. [1], Prasanth P. [2] and Udayanandan K. M. [3*]
1 School of Pure and Applied Physics, Kannur University, Payyanur Campus - 670 327, India.
2 Department of Physics, Govt. Engineering College, Thrissur - 680 009, India
3 Department of Physics, Nehru Arts and Science College , Kanhangad – 671 314, India
*E-mail: udayanandan@gmail.com

Abstract

In this paper we study the vibrations of different membranes. We show how loaded circular membrane produce harmonic music compared to the normal circular membrane and other shaped membranes. The frequency ratios of different modes are compared for rectangular, square and circular membranes.

\

RAIPTR-P13

Physics of Fort - Chittorgarh

G. S. MENARIA
PGT AND HEAD OF DEPARTMENT- PHYSICS,
St.TERESA'S SENIOR SECONDARY SCHOOL, MANSAROVER, JAIPUR
gsmenaria6@gmail.com

Abstract

Physics is there in every walk of life. We had a golden age of science in India science centuries. The concept of science was used in making forts, palaces, temples, towers, dams and master plan of ancient cities by the rulers of different religion at various part of the country. It is still unbelievable that how did they built such an amazing high rising structure in those days without machinery. In the presented research paper, it is tried at the first sight at prelims level to correlate concept of physics like uphill curved motion, motion against gravity on large inclined plane, pressure difference, reflection of light, etc in making India's largest UNESCO world heritage amazing Chittorgarh fort. These scientific concept were used by the rulers for safety of insiders of fort from outsider attackers in the form of making high rising protective walls for fort positioned on elevated hill 180 metre, 700 acres, 2 prominent commemorative towers, palaces, temples, seven protective gates, sharp twisty turn up hill road, water storage and supply management for years for thousands of people without external supply.

RAIPTR-P14

A Study of Ideal Quantum Systems Using Virial Expansion

Reshma P.[1], Nishanth P.[2] and Udayanandan K. M.[3*]
S. N. Polytechnic College, Kanhangad - 671 315, India.
School of Pure and Applied Physics, Kannur University, Kannur - 670 327, India.
Nehru Arts and Science College, Kanhangad - 671 314, India.
*E-mail: udayanandan@gmail.com

Abstract

The equation of state of a non ideal classical system and ideal quantum systems are studied using virial expansion. The pressure exerted by the quantum systems are compared numerically which will help the undergraduates to get a picture of the condensation of bosons.

Keywords- Virial expansion, Quantum system, Equation of state

RAIPTR-P15

Impact of thickness on refractive index of chromium nano films

[a*] Shivakumar Siddanna, Dept of PG Studies & Research in Physics, Kuvempu University Jnanasahyadri, Shankaraghatta-577451, Shimoga, Karnataka, India
[b] Devidas G. B., Dept of PG Studies & Research in Physics, Kuvempu University Jnanasahyadri, Shankaraghatta-577451, Shimoga, Karnataka, India
[c] Udachan L A Dept t of Physics, S S Tegnoor Degree College Kalburagi 585105, Karnataka, India
[d] Shiva L U Dept of Physics Rani Channamma University belagavi -591156, Karnataka, India
[e] Shrishail S Kolkundi, Government First Grade College Shahapur -585223, Karnataka, India
* Corresponding author: sbhairamadagi@gmail.com.

Abstract

Refractive index is a fundamental physical property of a substance, it is often used to identify a particular substance, confirm its purity, or measure its concentration. The concept of refractive index applies within the full electromagnetic spectrum, from X-rays to radio waves. The refractive index is a very important property of the components of any optical instrument. It determines the focusing power of lenses, the dispersive power of prisms, the reflectivity of lens coatings, and the light-guiding nature of optical fiber. In optics, the refractive index of a material is a dimensionless number that describes how fast light propagates through the material. The refractive index affects wavelength, it depends on frequency, colour and energy. Hence, we have undertaken the impact of film thickness on the refractive indices of chromium nano films. Chromium of purity 99.99% obtained from Leico industries, New York, USA was evaporated from a tungsten helix at pressure of (2-3 x 10^{-6}) Torr onto glass substrate held at room temperature (22 ^{0}C). Thickness of the film was monitored using digital quartz crystal thickness monitor. The rate of deposition was around 1 A^0/s. For optical studies, in order to grow films of uniform thickness, the substrate holder was rotated with uniform speed during deposition. Soon after the deposition the films were taken out of the vacuum chamber and inserted in the DK2 Ratio Recording Spectrophotometer for transmittance measurements. Here we report on the effect of thickness on refractive index of chromium films, in the thickness range (5-70 nm) for the visible (350-700 nm) wave length of incident radiation.

RAIPTR-P16

To Understand the Solar Safari in Convenient Scale

Dr.Dhakane S.F., Sudhir Phakatkar

Annasaheb Waghire College Otur Tal.Junnar Dist-Pune 412409

At post - Khodad Tal. Junnar Dist. Pune Maharashtra PIN 410504 6

Email:dhakanesf@gmail.com, sudhirphakatkar@gmail.com

Abstract

Student understanding solar system in easy way or in bearable scale is impossible due to limitations in the pages of the book. To overcome this difficulty, a simple model is developed by scaling down the solar system measurements. Using simple scaled down table method for better understanding of Physics student to familiar local identification locations may be added to get proper feel of solar system and the existence of human life. Using this model, understanding of solar system as an exercise is also given to think further more to know the importance of the solar system in human life and its importance on the earth.

Student can image or a picture or a figure shown in the text book of the solar system has limit of thoroughly understanding due to true scale as well as space available in the text book paper. Hence students do not get true feeling of the solar system. To overcome this problem, a simple model is developed. It may be titled as solar safari at meter scale and expressed in a simple model to understand easily and to create interest by teachers or educators to students. For creation of interest of student a simple model is developed by scaling down the solar system using this model student understand the solar system after explaining or creating the real picture of the solar system students to think regarding the influence of planets on human life in simple way. This simple model informing about our address, generally we used to tell our name, surname. And further, we do tell about our home location by explaining from lane, area, village, town, Tehsil, district, city, sub urban; up to the name of the metro. On national level it requires to tell the name of the state and on international level nation name is the must and finally the name of the continent and the planet called the Earth, which is our fulfill address.

RAIPTR-P17

Analysis of trace element present in the medicinal plant colocasia esculenta

[a*] Chitralekha.Alur, Dept of Physics, S.B. College of Science, Kalaburagi, Karnataka, India.
[b] Shivashankar, Dept of Physics, S.B. College of Science, Kalaburagi, Karnataka, India.
[c] Udachan L A, Dept of Physics, S. S. Tegnoor Degree College Kalburagi 585105, Karnataka, India.
[d] Shiva L U, Dept of Physics, Rani Channamma University belagavi -591156, Karnataka, India
[e] Shivakumar Siddanna, Dept of PG Studies & Research in Physics, Kuvempu University, Jnanasahyadri, Shankaraghatta-577451, Shimoga, Karnataka, India.
[f] Shrishail S Kolkundi, Government First Grade College Shahapur -585223, Karnataka, India.
* Corresponding author: chitraalur19@gmail.com.

Abstract

The objective of this review was to present the nutritional values, health and food security importance of taro as alternative food for developing countries. The term taro is used to refer to Colocasia esculenta (L). It is a family of Aracea cultivated for its edible corms. Taro is used as a stable food or subsistence food by millions of people in the developing countries in Asia, Africa and Central America. Taro has much importance in ensuring food security, in earning foreign currency as being a cash crop and also as a means for rural development.
Nutritionally, Taro contains more than twice the carbohydrate content of potatoes and yield 135 keals per 100 g. Taro contains 11% potein on a dry weight basis. This is more than yam, casssav or sweet potato. Many authors also stated that the protein content of taro is higher than the other root crops in leaves and tuber respectively. It contains 85-87% starch on dry matter basis with small granules size of 3-18 μm and ther nutrients such as minerals, Vitamin C, thiamin, riboflavin and niacin better than other cereals. Taro leaves, like higher plants, is rich in protein. The high protein content of the leaves favourably complements the high carbohydrate content of the tubers. In other parts of the world, the leaves of Colocasia esculenta have been reported to be rich in nutrients, including minerals such as calcium, phosphorus, iron and vitamins like vitamin C, thiamine, riboflavin and niacin. High levels of dietary fibre in taro are also advantageous for their active role in the regulation of intestinal transit, increasing dietary bulk and faces consistency due to their ability to absorb water. Most rural peoples suffer from malnutrition not because of the economic status but because of inability to utilize the available nutritious raw materials to meet their daily requirements. Now a day, zinc deficiency s widespread and affects the health and well-being of populations worldwide and since taro is one of the few non-animal sources of zinc, its utilization should therefore be pursued to help in the alleviation of zinc deficiency which is associated to stunting. It is also a good medicinal plant for prevention of kidney stones by using nanotechnology of nano particles.

RAIPTR-P18

EPR SPECTROSCOPY IN STUDY OF TUMORS AND CANCERS

AMIT SAHA[1] AND SWATI[2]
[1]B.Sc Physics Part III' St. Xavier's College, Ranchi, India
amitsaha0308@gmail.com
[2]B.Sc Physics Part III, St. Xavier's College, Ranchi, India
swati.24dec@gmail.com

Abstract

Electron Paramagnetic Resonance(EPR) spectroscopy is technologically spin-off in medical science. In the present study computational methods of Hartree Fock(HF) and Density Functional Theory(DFT)has been employed to detect tumorous and cancerous cells. The spin hamiltonian parameters of Zero Field Splitting(ZFS) and g tensor are investigated in some distorted symmetries. The computed parameters are compared with the experimental results. The theoretical computational study is successful to distinguish normal cells from tumorous and cancerous cells.

RAIPTR-P19

QUANTUM TREATING CANCER

Krishnakant Rana
krishnakantrana123@gmail.com

Abstract

Term cancer denotes malignant neoplasm characterised as class of diseases involving uncontrolled cell growth the cancer is not easy to define as a result the cell grow uncontrollable classical computers takes a lot of time to detect and even some hidden non linear structure are not well recognised But all these problems can be resolved efficiently by quantum computers Quantum algorithm that outperform classical computation have focussed primarily on the non abelian hidden subgroups problems which generalize the central problems solved by shor factoring algorithm The problem of hidden non linear structure can be solved efficiently by quantum computers Also quantum shear shorting algorithm used to reduice the number of time steps

RAIPTR-P20

STUDY OF THE EFFECT OF SOAP CONCENTRATION ON SURFACE TENSION OF WATER THROUGH LASER DIFFRACTION METHODS

Dr. V Anuradha, Dr. S Subhadramma and Dr. K C Radha, Department of Physics
Vijaya College, RV Road, Bengaluru-560004

Abstract

Soaps and detergents play an important role in dirt removal by decreasing the surface tension of water. This decreased surface tension is due to the hydrophobic and hydrophilic ends of the soap molecules forming a layer between the water molecules. In this experiment we study the effect of concentration of liquid detergents on the surface tension of water, and hence it's cleansing potential. The apparatus consists of an electrical vibrator that creates standing waves in the liquid medium, which acts like a grating. A laser beam is focused on it and due to diffraction, equally spaced fringes are observed on the screen. Surface tension is calculated by observing the effect of different frequencies on fringe width. Viscosity of liquids is found using a light meter which measures the intensities of the different fringes formed. Solutions of liquid detergents with distilled water are prepared which are used as the fluid medium for diffraction. The surface tension experiment is carried out accordingly for various concentrations. Surface tension of distilled water was found to be approximately 60 mNm^{-1} and the viscosity of distilled water, 0.98 mPa.s. The surface tension of distilled water dropped from 60 mNm^{-1} to as low as 32 mNm^{-1} when detergent was added to it. Also, with increase in concentration of detergent, there was a slight noticeable dip in the surface tension of water. There was no discernable change in the surface tension after a particular concentration.

RAIPTR-P21

Accuracy of students' self-judgement about their conceptual understanding of Electric Force and Field

Santosh Kumar Umar*, Ashok Kumar Mittal and Vivek Kumar Tiwari
Physics Department, University of Allahabad, Prayagraj-211002, India
*E-mail: 91k.santosh@gmail.com

Abstract

In this paper we explore the accuracy of students' self-judgement about conceptual understanding of Electric Force and Field. For this purpose, a test comprising ten questions from CSEM (Conceptual Survey of Electricity and Magnetism) was administered to undergraduate and post-graduate students of Allahabad University and its affiliated colleges. For each question, students were required to rate on a scale of 1 to 5 their confidence in the option chosen. Confidence Accuracy Quotient (CAQ) has high correlation with Total Score. Average CAQ on a question has very high correlation with average score on the question. These results suggest existence of strong misconceptions.

RAIPTR-P22

Estimation of the width of Onion Epidermal Cells using Laser Diffraction

Dr P Aswini,Associate Professor, Department of Physics
Dr.Madhumita Ghosh Dastidar, Associate Professor, Department of Microbiology
Vijaya College, Basavanagudi, Bengaluru-560004

Abstract

In the present experiment, we estimate the width of Onion Epidermal Cells as obtained by Laser Diffraction method and compare with that obtained by the actual Micrometry. The Onion Epidermal Cells are approximately equally spaced. Therefore, they act as one dimensional diffraction grating. Thus, their size can be estimated using diffraction technique. We find that the size as estimated by the diffraction technique and the micrometry coincides within the range of experimental errors. Thus, diffraction technique can be extended to study the size of cells (of the micrometer order) which are equally spaced employing a laser which makes the task easier.

RAIPTR-P23

Study of laser-induced persistent photo-dielectric effects in Se-Te-Sn-Cd chalcogenide glassy semiconductors (STSC ChGs)

Amit Kumar[1], Neeraj Mehta[1*]
[1]Department of Physics, Banaras Hindu University, Varanasi
[1*]Department of Physics, Banaras Hindu University, Varanasi

Abstract

Chalcogenide glasses (CHGs) have broad range of applications in modern electronics, optoelectronics, electrical and optical memories etc. [1-3]. In last 2 decades, these materials have been seriously investigated due to their technologically important electrical properties. A lot of work has been done by various research groups on dielectric relaxation in CHGs. From above literature, one can see that the variation of composition is used as a conventional method for changing the dielectric properties of CHGs [4, 5]. This motivated us to start work on multi-component glasses (quaternary alloys) using a new trend for tailoring the dielectric properties in novel quaternary glass. For this purpose we have used cw-lasers of four different wavelengths as a tool. We have observed significant variation in dielectric parameters (i.e., dielectric constant e¢ and dielectric loss e²) and a.c. conductivity after exposure of novel multi-component STSC ChGs by laser light of different wavelengths. The changes occurring in dielectric properties of a photo-sensitive material due to its illumination by radiation of appropriate wavelength is termed as the photo-dielectric effect (PDE) [6-8]. This effect has been observed in many photo-sensitive materials like crystals, dielectric oxides, other materials and amorphous semiconductors (especially ChGs). But no preliminary attempts have been done to investigate PDE in an extensive manner. In fact, there is no uniform theory to explain all observable facts because of the complexity of the effect. This motivated us to start the extensive experimental and theoretical work in this particular direction. Thus, the study of PDE and its consequences is still an unresolved problem. It is crystal clear from recent and old literature that the future of photo-dielectric devices is bright because such devices will avoid several serious shortcomings encountered with conventional photovoltaic devices and such devices will be useful for optical control of dielectric properties [9-11]. In present work, we have synthesized novel multi-component (Se-Te-Sn-Cd) STSC ChGs using low cost melt-quench technique. We have observed the PDE in chalcogenide glassy semiconductors at different audio frequencies and temperatures after the exposure of the samples by cw-lasers of different wavelengths.

The results of the present study open a way for the improvement of ChGs as inventive opto-electronic materials having laser-induced direct tuning of dielectric properties. Such studies are also relevant for the novel applications of opto-electronics like laser-controlled touch displays.

RAIPTR-P24

CAREER OPPORTUNITIES FOR B. SC. STUDENTS IN SUGAR, ALCOHOL, ETHENOL AND ALLIED INDUSTRIES

B. P. Relekar[1], S. B. Mane[2], N. S. Shinde[3]
1. Y. C. Science College, Karad
2. R. C. S. T. Islampur
3. K. B. P. College, Islampur

Abstract

India is second in the world in sugar cane growth and sugar production. About 41000 Lakh tons of sugar cane is produced every year. Five hundred ten factories are producing sugar. Alcohol and ethanol are byproducts of Sugar Industry. Indian alcohol industry is 3rd largest in the world and the growth rate is 10-12%. Central Govt. new policy of mixing ethanol with petrol and subsidies to start new ethanol industries will boost job prospect in sugar, alcohol and ethanol industries. The Students who have completed B. Sc. With physics, Chemistry and Mathematics have good opportunity to make career in these industries if they do post Graduate Diploma and Certificate courses after B. Sc. They will get immediate job as trainee Assistant Chemist or Sugar technologist. This sector lacks trained manpower because in whole of India there are only Three Institutes which are involved in manpower training. They are National Sugar Institute, Kanpur (NSI), Vasantdada Sugar Institute, Pune (VSI) and Rajarambapu College of Sugar Technology, Islampur (RCST). Out of these RCST is the only institute affiliated to University system and providing training to students at Under Graduate and Post–Graduate level. One can start career as Assistant Chemist or Assistant Sugar technologists and reach up to the level of General Manager or Managing Director. There are good number of Distilleries, Breviaries and Wineries which also provide job to these trained students. Large numbers of Ethanol plants are coming up due to policy of the Government.

RAIPTR-P25

Need of history of physics integrated into classroom teaching

Nityendra Keshav Oke
okenitin@gmail.com

Abstract

I know this is not a research paper, even then will wish to include as we need students of science equipped with enthusiasm, curiosity, bunch of questions but some questions are such that their answers cannot be found in light of science and we need to take help of history. While teaching physics to under graduate and post graduate level there are large number of transitions in physics where science cannot justify the change, we need social science to explain the fact. I will give examples of few facts and will use history to explain the same.

RAIPTR-P26

ICT an Effective Tool for Teaching Quantum Mechanics

Mahendra Kumar
Department of Physics, D. B. S. college, Kanpur
E – Mail : mahi_rachana123@ rediffmail.com

Abstract

Different studies show that the use of technology in education system has developed new ways of teaching and learning. By using latest technology we can improve teaching skill by providing a better understanding of the topics for students as compared to conventional teaching (Chalk-board teaching). Purpose of this paper is to examine carefully effect of modern innovative teaching tools particularly computer technology in understanding the basic concept of Quantum mechanics. We have started teaching Quantum Mechanics at UG level by using Power Point Presentation in class rooms. In our presentation we included all the information about the basics of Quantum mechanics for any particular topic.

RAIPTR-P27

XRD study of Transition metal ions doped in $(ZrO_2)_{0.8}(Y_2O_3)_{0.2}$ ceramic compound

O P Gupta, D C Gupta, A P Srivastava and R K Mishra
Dept. of Physics, D B S College, Kanpur

Abstract

The phenomenon of electron spin resonance under certain condition is found very useful in providing the information about the bulk properties like specific heat, susceptibility etc. of the system. The resonance spectra which help us to obtain reliable interpretation about the nuclear spin of paramagnetic ion. In this paper we present the results of X- ray diffraction and EPR studies in $(ZrO_2)_{0.8}(Y_2O_3)_{0.2}$ ceramic compound doped with some transition metal ions. The present work provides that how doped impurities of transition metal ions change the composition of the system along with noticeable result.

RAIPTR-P28

USE OF INFORMATION TECHNOLOGY IN PHYSICS TEACHING

D. C. Gupta, A. P. Srivastava & O. P. Gupta
Physics Department, DBS College

Abstract

Infromation technology has made a revolutionary impact on physics teaching, which is unparallel. Generally Physics as felt dry and tough by scholars . While Physics principles plays a vital role in our day to day life about which a common man is unaware even some times we teachers are unable to relate to the concept of the physics. In order to improve the quality and effectiveness of physics education and to inculcate scientific thinking: we have carried out an experiment by taking two groups of students, same topic was taught to both groups using Digital presentations. One group understood the facts by the presentation prepared by teacher while another group was asked to brainstorm and prepare their own presentation with the help of supplied content and searching through internet Later a test was organized to test the understanding and astonishing results were found. The group who prepared their digital presentations on the same topic has shown remarkable performance because of self learning , interactions and keen interest in preparing digital content. The scope of present work is that the implementation of information technology in the infrastructure of our present education system will enhance learning capabilities, communication power and build real understanding considerably and thinking power as well.

RAIPTR-P29

ROLE OF INFORMATION TECHNOLOGY IN PHYSICS EDUCATION

Mr.Harshal A.Sanghvi
Affiliation: M.Sc.-ITIMS, Department of Animation, ITIMS and Mobile Application, University School of Sciences, Gujarat University, Ahmedabad-380009
Email:harshalsanghvi96@gmail.com

Abstract

In the modern era of technology teaching physics has been much interesting and involving people of all age groups to understand the fundamentals and concepts of the phenomenon which occurs. Technology plays a major role in imparting the knowledge as well as to practice the experiments in a virtual laboratory environment. Infrastructure of laboratory is the key factor for making students involve in learning physics. Information Technology plays a huge contribution in making various complex calculations and deriving the necessary results. Information Technology Infrastructure helps students to use virtual infrastructure wherein the students can use the hardware as well as software configuration and can run numerous softwares on the virtual machine. Virtual machine provides the hardware configuration as per the necessity at a minimal cost so that students do not have to spend a huge amount from their pockets to upgrade their computer system. This paper describes about the virtual infrastructure which we can use in order to get the required hardware configuration to run the software online and also for the online education.

Awards

Dinabandhu Sahu
(10-10-1910 to 7-10-1980)
A brief profile of the multi-faceted personality

The Person: Late **Dinabandhu Sahu** was first and foremost a patriot, whose actions in public sphere, in and outside Government, were directed towards social, educational and economic advancement of people at large and development of the nation. He was deeply influenced by Mahatma Gandhi which was reflected in his humane dealing with all persons irrespective of their position or station in life. Everyone who interacted with him felt close to him. As a person, he was upright and fearless. He was a brilliant lawyer and his cross-examination skills are legendary. It is said that he declined an invitation to join the higher judiciary because he did not want to give up his wide human interactions. The untimely demise of a young daughter in an accident affected him profoundly and he gravitated towards spiritual matters after this tragic incident.

Support to Freedom Struggle: The freedom struggle in feudatory states of Orissa took the form of Prajamandala Movement. **Dinabandhu Sahu** had defended, at his own expense, several leaders of Prajamandala Movement. The mass protests were particularly intense against the inept, corrupt and exploitative Ruler of the then Ranapur State. Major R. L. Bezzelgate, the British Political Agent, was called in to quell the protests. On 5 January 1939, one of the protesters was shot dead by Bezzelgate and the assembled mass went after the British Officer and he was killed. Dinabandhu Sahu, then a young lawyer, defended the accused in a special court in Ranapur, facing the wrath of the Ruler, physical hardship and real danger to his life. He also offered his legal services free and defended many Freedom Fighters, irrespective of their political affiliation.

Public Service (Political): Was elected to the Orissa Legislative Assembly from Kendrapara Constituency. He was in the Council of Ministers of Orissa Government constituted in

1946: Minister of Law, Health and Development
1952: Minister of Education
1957: Minister of Industries, Mining & Geology

As a Minister, Dinabandhu Sahu introduced a number of path breaking legislation and initiated many innovative schemes for industrialization and development of Orissa. He represented Orissa in Central Advisory Board of Education and National development Council. The co-operative movement was given a boost by him.

Advocate General of Orissa from 1961 to 1967

Other significant public service

Founder and President of Kendrapara College and Engineering School at Kendrapara
President of Akhila Bharatiya Tailika Vaishya Mahasabha for many years
District Governor of Rotary Club
Member, Orissa Study Group, National Police Commission
Member of Mandal Commission

…….

Indian Association Of Physics Teachers

(Registered under Section XXI of Societies Act 1860, Reg. No. K-1448)

Regd. Office : Flat No. 206, IInd Floor, Adarsh Complex,
OPR-4, Awas Vikas-1 Keshavpuram, Kalyanpur, Kanpur-208017
Email: iaptknp@rediffmail.com Ph.: 9415404969, 9839035685, 9935432990

Prof. K. N. Joshipura
General Secretary

4, Punit Park, Anand-Vidyanagar Road,
Anand - 388 001
Ph. : 02692-245042, 09825318897
E-mail : gensecretary.iapt1@gmail.com

Dated September 05, 2019

IAPT DSM Award – 2019 to Dr. Punita Verma, Department of Physics, Kalindi College, University of Delhi, Delhi

Dear Dr. Punita Verma,

I am very happy to announce that YOU ARE THE WINNER OF THE IAPT-DSM AWARD FOR THE YEAR 2019. This annual Award is in recognition of your excellent all round efforts as an outstanding teacher, and your significant contribution to the cause of UG Physics education.

Please accept congratulations from me and from the whole of IAPT spread across the length and breadth of our country. The Award will be conferred upon you in the Annual IAPT Convention to be held at IIIT Allahabad-Prayagraj during October 13-15. Please do attend and receive the Award in person. Please continue to carry out activities and programmes for promoting Physics education for the benefit of teachers and students.

With regards and best wishes,

Prof. K. N. Joshipura,

General Secretary IAPT

Ex-Professor, Sardar Patel University, Vallabh Vidyanagar Gujarat

INDIAN ASSOCIATION OF PHYSICS TEACHERS

IAPT-DINABANDHU SAHU MEMORIAL AWARD

Citation

Dr Punita Verma
Kalindi College, University of Delhi.

For her contribution to Undergraduate Physics Teaching for over two decades-

Dr Punita Verma has mentored a large number of teachers via the Delhi Association of Science Education. She has mentored and motivated an even larger number of young students involving them in innovative projects and honing their problem solving skills. She has raised awareness about the interdisciplinary nature of science and the scientific contributions of ancient India;

IAPT confers on you the IAPT Dinabandhu Sahu Memorial Award on the 13th of October 2019.

Prof. K N Joshipura
(General Secretary)

Prof. Vijay Singh
(President)

INDEX

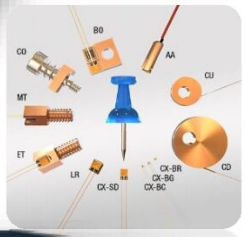
INDEX

INDEX

INDEX

Specialise Instruments
INTELLIGENT SOLUTIONS

Cryogenic Instruments & Accessories



- Cryogenic Temperature Controllers & Monitors.
- AC Resistance Bridge/ Temperature Controller
- Cryogenic Temperature Modules
- AC and DC Current & Voltage Sources
- Cryogenic Temperature Sensors
- HR Series Sensors
- Temperature Probes
- Cryogenic Accessories

Magnetic Instruments

- Gaussmeters/Teslameters
- Hall Probes & Hall (Magnetic) Sensors
- Fluxmeter
- Helmholtz and Search Coils

Features of the 8400 Series Hall Effect Systems

- Ideal for variable temperature measurement and mobilities from 1 to 106 cm2/V s
- Optional AC field extends mobility measurement range down to 10-3 cm2/V s
- Maximum DC fields to 1.67 T (8404) and 2.25 T (8407)
- Optional AC fields to 1.18 T (8404) and 1.31 T (8407)
- Standard resistance range of 0.5 mΩ to 10 MΩ
- High resistance option widens range to 200 GΩ
- Low resistance option significantly reduces resistance noise floor
- Temperatures from 15 K to 1273 K

Lake Shore CRYOTRONICS

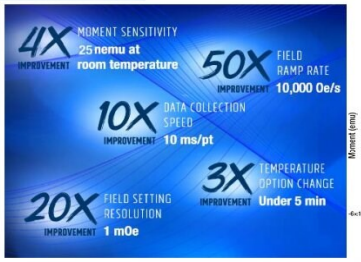
Model EMPX-H2

Model CPX

CRYOGENIC PROBE STATIONS

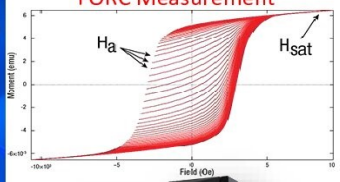
- Temp 1.6K – 675
- Field: Max Field upto 3T (Horizontal/ Vertical)
- Max probe up to 6 probe arms
- Max sample size 2in sample diameter (std) / 4" sample diameter (Model FWPX)
- Vacuum: 10^{-5} torr (std) / 10^{-7} (Optional)
- Terahertz (THz) probing possible
- Cryofree options also available

Model TTPX



Model 8600 Series VSM

FORC Measurement



8600 Series Features

- 0.25 × 10^{-7} emu noise floor at 10 s/pt.
- 10 ms/pt data acquisition rate.
- 10,000 Oe/s field ramp rate.
- Rapid, repeatable temperature option exchange.
- High stability—±0.05% per day.
- Fields to 3.26 T.
- Widest available temperature range—4.2 K to 1273 K.

Lake Shore CRYOTRONICS

M91 FastHall™ controller

- FastHall technology eliminates the need for magnetic field reversal for van der Pauw samples.
- Traditional DC field Hall measurement (field reversal required).
- AC field Hall measurement for very low mobility.
- Extends mobility range down to 0.001 cm2/V s, without using AC field techniques.
- High resistance option enables measurement of samples >10 MΩ, up to 200 GΩ.
- Operation over simple SCPI command interface or in conjunction with MeasureLINK-MCS software.
- Digital and analog I/O for simplifying integration and data gating.

MeasureReady™ 155

- Low RMS noise: from 200 nV (10 mV)/7 pA (1 µA)
- Bipolar, 4-quadrant power source
- DC and AC modes supported up to 100 kHz*
- Full scale ranges—voltage: 10 mV to 100 V, current: 1 µA to 100 mA
- 0.001% programming resolution (from 100 nV/10 pA)
- In-phase reference output for use with a lock-in amplifier (155-AC only)
- Manual and autorange function
- Front and rear input connectors
- Touchscreen user interface
- Wi-Fi, USB, and LAN connectivity (GPIB option)

Specialise Instruments Marketing Company
A-305, Building No.2, 3rd Floor, Kailas Industrial Complex, Parksite, Vikhroli (West)
Mumbai - 400079 INDIA Fax: 91-022-25171924 Tel: 91-022-25171922 / 23.
Email: info@simc.co.in / sanjiv@simc.co.in Web: www.simc.co.in

Nmolab (नमोलैब) Welcome All Delegates

Greetings!

We would like to introduce our company **'NmoLab Equipment's'Pvt.Ltd.**, as a very young and dynamic company, supplies wide range of best quality science and engineering research Materials and equipments at a fair and reasonable price. Our aim is to make research simpler and faster by providing on-time support to choose the best options, simplifying order policy and by giving fastest delivery. **NmoLab Equipments Pvt. Ltd.** also offers a user friendly common platform to find the best options for your research easily. We believe to build a seamless platform where people can come to find and discover anything for LAB. We believe in saving customers precious time and their money by providing them the best research materials and equipment/instruments.

We believe it is our primary role and responsibility to support researchers, professors and other laboratory professionals with the very best service and quality products at a fair and reasonable price.

Supply & Services

1. **All kind of Lab RESEARCH MATERIALS.**
2. **All kind of Lab Equipment's Research Grade & Educational Grade.**
3. **We Used to Take Turnkey Lab Projects.**
4. **All kind of Laboratory Glassware, Lab Chemicals as well as Lab Furniture**

Happy Customers

Purnima Singh (Director)

NmoLab Equipments Pvt. Ltd.

Address: Plot Number-39/7/1 , Street No-2 ,Khera Garhi Delhi-110082 , India
Contact No: +91-9811156300, +91-9811146300, +91-8585916161
eMail:psnmolab@gmail.com , sksnmolab@gmail.com
website: www.nmolab.com

Branch Off: Mumbai Kolkata Hyderabad Prayagraj Varanasi Chandigarh

SCIENTIFIC & ANALYTICAL INSTRUMENTS

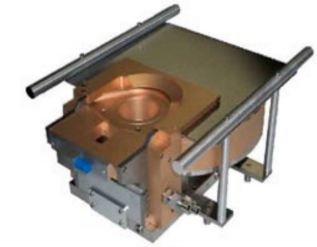
India's Emerging

VACUUM SCIENCE TECHNOLOGY COMPANY

DEDICATED TO SERVICE

Scientific & Analytical Instruments offers a Range of Thin Film Deposition Systems like Thermal Evaporation / RFDC Sputtering System/ Electron Beam Evaporation Systems & first in India Complete Gas Sensing System & LPCVD Systems.

RFDC SPUTTERING SYSTEM



ELECTRON BEAM GUN

THERMAL EVAPORATION SYSTEM

LPCVD SYSTEM

GAS SENSING SYSTEM

RANGE OF PRODUCTS:

- Thin Film Deposition Systems
- Gas Sensing Systems
- LPCVD Systems
- Vacuum Oven & Furnaces
- Vacuum Pumps & High Vacuum Pumping System
- Vacuum Gauges & Components
- Mass Flow Controllers
- Sputtering Targets, Evaporation Material
- Thin Film Deposition Consumables
- Spin Coaters, DIP Coaters, Chillers

OVERSEAS PRINCIPAL & SERVICES OFFERED:

Representative of Telemark USA
Representative of Stepper Care USA
Representative of Wonder Materials
Helium Leak Detection
Servicing of RF Generators
Servicing of Thin Film Deposition Systems
Retrofitting of Thin Film PVD Systems
Servicing of Vacuum Pumps
Servicing Vacuum Oven & Furnaces

DEDICATED TO SERVICE

SCIENTIFIC & ANALYTICAL INSTRUMENTS

F-5, GROUND FLOOR, OKHLA INDUSTRIAL AREA, PHASE-I, NEW DELHI-110020

Tel: 011-41037156, 9650866152; Email: sainanotech@gmail.com, web: www.sainanotech.com

f

g

h

INDIAN INSTITUTE OF INFORMATION TECHNOLOGY ALLAHABAD

XXXIV ANNUAL IAPT CONVENTION-2019

Sponsored By

IIIT Allahabad

Council of Scientific & Industrial Research (CSIR)

Cambridge University Press

Scientific & Analytical Instruments

Indian Association of Physics Teachers (IAPT)

IEEE

Specialise Instruments

Rigaku