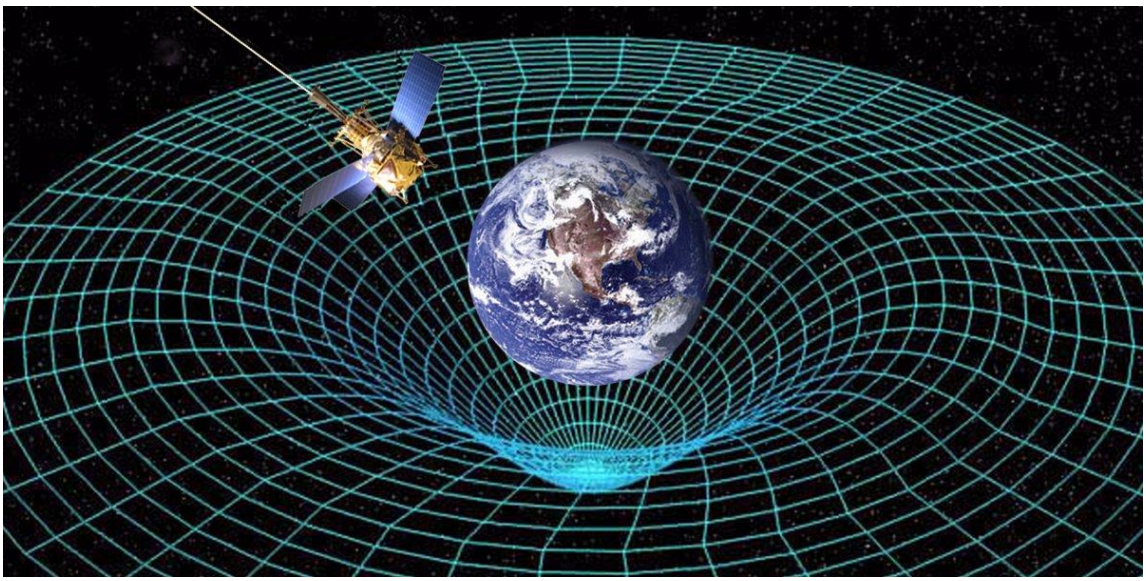
6th
IAPT National Student Symposium on Physics

4–6 October 2018



Indian Association of Physics Teachers

and

Department of Physics, Panjab University, Chandigarh

Supported by: DST - Chandigarh Administration

NATIONAL STUDENT SYMPOSIUM ON PHYSICS

Twenty-first century is the knowledge century. The innovations are supreme. To foster a culture of innovation and creativity among the young students, IAPT has instituted the annual National Student Symposium on Physics to provide a national forum to young students to present their new ideas and innovative work at an early stage, which will lead to their growth as creative and original researchers.

MESSAGE

The National Students' Seminar in Physics (NSSP) jointly undertaken by Department of Physics, University of Punjab and Regional Council 2 of Indian Association of Physics Teachers is now in its sixth successive year. The fact that the program has gone on successfully all these years speaks of its necessity, importance and popularity. The organizers of the program deserve great acclaim for their consistency and dedication and their love for students. The NSSP has indeed become a flagship national program of IAPT and as the President of IAPT I feel very proud of it.

It is now realised and acknowledged all over the world that students even while they are still in their undergraduate or postgraduate years have innovative ideas and are often quite creative. Programs which encourage students' creativity are now conducted in many counties including India. This approach is further strengthened by advances in pedagogic research. Young artists and craftsmen learn from their masters by observing their work and working first under and later with them. This model of learning involving master-apprentice relationship is now being followed in many institutions of higher education in science. Students are given opportunities to observe how scientists work and to learn how to do research. I believe that NSSP has been inspired by this model.

I appeal to the students from various parts of the country whohave been fortunate to participate in this wonderful program to derive maximum benefit from it and return home imbued with a desire to pursue science life-long. They should realise that science is not only the most exciting and rewarding human enterprise but it is also the most important vehicle of national development.I wish this year'sNSSP program a resounding success and wish also that the program continues with increasing degree of success for years on in inspiring the physics student community in the country.

H. C. Pradhan
President, IAPT

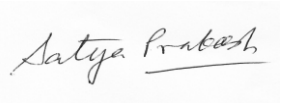
MESSAGE

The Indian Association of Physics Teachers (IAPT) established in 1984 felt equally concerned about the state of science teaching in the country. As the commitment of IAPT for the quality of physics teaching, it was decided to catch hold and motivate the young graduate (UG) and post graduate (PG) students, bring them together, inspire them to do science though interaction with learned teachers, scientists and among themselves. To achieve this goal IAPT decided to hold the "National Student Physics Symposium on Physics" (IAPT NSSP) each year.

The first IAPT NSSP was organized by IAPT in collaboration with Department of Physics, Panjab University Chandigarh on Feb. 25-27 2013 . To our surprise, the students from all over India even from rural colleges participated. These students worked hard with their full intellectual strength for all three days They presented their project and research work and had intensive discussions with the learned motivators. The new concepts and techniques were identified and the students were encouraged to persuade their scientific innovations. The proceedings of NSSP was published in "Student Journal of Physics"

The enthusiasm and involvement of young students in the scientific research encouraged us to hold the second IAPT NSSP which was done here itself in Jan 2014. Again the response and participation of students was enormous and the expectations from IAPT were still higher. Believing that IAPT will come up to the expectations of the young students, IAPT is holding NSSP each year to motivate young physicists. This is 6th IAPT NSSP again in collaboration with Physics Department, Panjab University, Chandigarh. I, on behalf of IAPT would like to express my sincere thanks to Honorable Vice- Chancellor, administrative staff and Physics family of Panjab University and associated institutions for their untiring efforts to this continuity.

This year again the young UG and PG students are from all parts of the country. The learned teachers have very kindly agreed to motivate the students. I welcome them all and express my sincere gratitude to them and as well as the respected members of the organizing committee for their sincere efforts and wish the 6th NSSP a grand success in all respects.



Satya Prakash
Convener, NSSP- 6

ABOUT IAPT

A voluntary organization of Physics Teachers (at all levels), Scientists, professionals and other interested in physics (Science) education in the country

Indian Association of Physics Teachers (IAPT) was established in 1984 by dedicated physics teacher and visionary (Late) Dr. D.P. Khandelwal with active support from likeminded features with the aim of upgrading quality of physics teaching at all level in the country. Since then it has grown into a major organisation with about 6000 members spread over throughout the country and abroad, besides annual members, student members and sustaining members. All IAPT work in voluntary, no remuneration is paid to members for any IAPT activity.

The Association operate through its 20 Regional Councils (RCs) grouped into 5 zones. These is a central Executive Council (EC) which controls and coordinates all its activities.Regional Councils also have a similar structure.

Current Activities of IAPT

Publications

Bulletin – a monthly (32 pages) with the record of uninterrupted publication since 1984. Besides reporting IAPT activities it also carries articles on developments in physics and physics education. Free to the members, it also serves as a vehicle of expression and communication amongst them.
Journal of Physics Education – The IAPT has taken over the publication of this quarterly (previously published by UGC) publication since April 2001 (volume 18). Life members of IAPT can get it at concessional rate. It carries research articles on Physics education
Prayas – A quarterly journal carries out articles and research reports by UG/PG students. It also carries invited articles from physicists of repute, now rechristened as *Student Journal of Physics*.
Pragami Trang – This bilingual (Gujarati & Partly English), has been started since 2009 by Gujarat RC.
Horizons of Physics – In a book series brought out for physics teachers and students. Each volume contains about 15 review articles written by experts, taking off from the B.Sc. level and leading to the frontiers of the field.

National Standard Examinations

National Standard Examinations are held at 3 levels with the objectives: to enable the student judge him/herself against a national standard; to present correct perspective of physics; to enhance the students-teacher interaction through discussion on the Q-paper. Members or students are identified, duly honoured and awarded medals and token prizes. These examinations constitute the first step towards participation in International Olympiads in respective subjects. The responsibility of selecting and sending the Indian team to the international Olympiads rests with the Homi Bhabha Centre for Sciences Education (HBCSE) with whom IAPT works in close collaboration.

Evaluation of experimental skills

IAPT started this evaluation with NSEP and NGPE, examinations since 1992, essentially to stress the point that no evaluation of a science student is complete without inclusion of an evaluation of experimental skills.

Extra Low-Cost Book (ELCB) programme

Under this programe life members are offered quality physics books at a considerable discount, under arrangement with publishers. The aim is to help teachers build up their personal libraries.

For teachers

NCIEP (National Competition for Innovative Experiments in Physics): This programme is being held since 2003, to encourage Physics Teachers to conceive and set up original innovative experiments in Physics. The Competition is held every year at the venue of The Annual Convention. The high quality of entries shows the usefulness of the programme.

National Competition for Computational Physics (started 2011)

Essay Competition: Gujarat RC of IAPT organizes a National Essay Competition for all teachers for the last few years.

Anveshikas (Experimental Physics Centres)

The first such centre was established at SGM Inter College, Indira Nagar, Kanpur in 2001. It provides a base for generating interest in Experimental Physics in young students. upto +2 level through learning by doing. Facilities exist for conducting Teachers Orientation Programmes for encouraging them to undertake class room teaching through demonstrations. A mobile unit gives demonstrations in schools by prior appointment. Each demonstration session is of about 2-3 hour duration. This programme generates interest is students for Physics and clarifies the basic principles. A number of such centres are now coming up in the country.

NANI: It has been decided to establish a National Anvashika Network of India (NANI) of 100 Anveshikas. Already (2011) nearly 15-20 Anveshika's have come into existence others are in the offering.

Centre for Scientific Culture (CSC): The Centre established at Midnapore College, Midnapore (WB), provides an year round exclusive facility, of working experiments in Physics. It is also engaged in developing laboratory experiments exercises in physics at school level.

Orientation Programmes/Seminars/Workshops for Teachers

These are organised regularly by Regional Councils in both, theoretical and Experimental Physics. A number of such programmes have been carried out with the support from MHRD, Infosys Foundation and other such agencies.

Conventions

A 3-day National Convention is organised every year, since 1984 on some specific theme.
Papers are presented by members and lectures are delivered by experts in the field. Presentation of innovations in teaching methods, demonstrations and lab experiments is a regular feature in all conventions.

Regional Councils also organise regional conventions at their convenience. Teachers' talent in various aspects of Physics education is identified and rewarded by organizing contests during conventions.

ABOUT DEPARTMENT OF PHYSICS, PU

The Department of Physics was established in 1947, in Govt. College, Hoshiarpur (Punjab). In August 1958, the department was shifted to the present campus. At that time, the department was headed by Prof. B.M. Anand who had worked with Nobel laureate C.F. Powell. The faculty numbered about a dozen and Prof. Anand soon established a high-energy particle physics group (nuclear emulsion) and optical UV spectroscopy group. The experimental nuclear physics group and mass spectrometry section came into existence soon after.

With Prof. H.S. Hans joining the department in the late sixties, the research activities got a major fillip—cyclotron was installed. Three major research groups in nuclear physics, particle physics and solid-sate physics including both theory and experiments were strengthened and mass spectroscopy laboratory was modernised. Since then the department never looked back. It has UGC Special Assistance Programme (SAP) from 1980 to 1988 and College Science Improvement Programme from 1984 to 1991. With the success of the above programs and of research activities in particle physics, nuclear physics and solid-state physics through national and international collaborations, the department became a major research centre amongst Indian universities.

In 1988, the department was accorded the status of Centre of Advanced Study (CAS) by UGC with three major thrust areas, particle physics, nuclear physics and solid-state physics, which is a unique feature in itself. The department is now in CAS forth phase. At present the department has a strength of 29 faculty members, 47 non-teaching/administrative staff, around 120 research students, 15 M.Phil. students, 10 Post-M.Sc. Course in Accelerator Physics students and about 350 graduate and undergraduate students. Our students clear various entrance examinations, like GRE, BARC, TIFR, DRDO, UGC/CSIR test for research and career in teaching, besides entering professional courses, like M.Tech., MCA, etc. About 30 research projects worth eight crore rupees under national/international collaborations are operating in the department.

Besides imparting quality education to the department students, the faculty also teach specialisation subjects, like nano-technology, nuclear medicine and medical physics to name a few.

The department participates in various national and international research initiatives and also hosts various conferences, seminars, meetings etc. of research interest regularly. The department has an 11-inch telescope to encourage/inculcate the scientific temper among public and with particular emphasis on college and school students.

The department houses Indian Association of Physics Teachers (IAPT) office and actively leads in IAPT and Indian Physics Association (IPA) activities.

RUCHI RAM SAHNI – A MULTIFACETED PERSONALITY

Ruchi Ram Sahni (1863-1948) was born barely 14 years after the British annexation of Punjab and lived to see India become independent. His life thus spans a very important period of history. He was the first person from Punjab to make a career in science. He was the first Indian officer in the India Meteorological Department (1885). Moving by choice to teaching, he became the first Indian science professor at Government College Lahore which he served from 1887 till his retirement in 1918. The University instituted Ruchi Ram Sahni Declamation Contest Prize in his honour. He is also India's first nuclear scientist who published two research papers in 1915 and 1917 working in the laboratory of Ernst Rutherford in Manchester where he interacted with Niels Bohr. (Interestingly, in his laboratory work, he was assisted by his son Birbal Sahni, the well-known paleobotanist, who was at the time studying in Cambridge.) He remained a member of Punjab University Senate and of Syndicate for a number of years, till 1921. In 1923, he entered Punjab Legislative Council as a member of the Swaraj Party. Ruchi Ram was a conscientious and inspiring teacher who spent six months learning carpentry for the sake of laboratory work. His instructor in the craft who also doubled as his teacher in art and aesthetics was Bhai Ram Singh, later the celebrated architect of Khalsa College, Amritsar. Having been a student who came up in life through scholarships and help from well-meaning people, he took his mentoring role very seriously. One of his students whom he mentored in various ways was Shanti Swarup Bhatnagar, who was appointed Director of Scientific and Industrial Research in 1940, and who set up a string of national laboratories in independent India. Ruchi Ram, his geologist son Mulk Raj Sahni, Birbal Sahni and Bhatnagar were invited by C. V. Raman to be foundation fellows of Indian Academy of Sciences established in 1934. Coincidentally, the Sahnis' ancestral home town Bhera, now in Sargodha district, Punjab, Pakistan, is also Bhatnagar's birthplace.

Ruchi Ram was in addition a social and religious reformer, science popularizer, text book writer, and author and after retirement an active follower of Mahatma Gandhi. Product of a liberal composite culture, he learnt Urdu and Gurmukhi besides physics and chemistry and came to appreciate the intrinsic beauty of the Persian language. As Kapurthala Alexandra Scholar at Oriental College, Lahore he delivered lectures on science in Urdu to its students, and even translated a book on conservation of energy from English into Urdu. It is a separate matter that the translation could not be published because of lack of funds.

He was an enthusiastic advocate of Punjabi (and regional languages in general) 'as a vehicle of scientific ideas'. He gave public lectures in Punjabi in Lahore, other towns and even remote villages. All his lectures were 'illustrated with easy experiments, often with simple apparatus which any one could make for himself'. His own estimate was that he gave about 500 popular lectures in all under the auspices of the rather short-lived Punjab Science Institute which he co-founded in 1885. In conjunction with the Institute he set up a workshop as business venture for repairing old instruments and making new ones. A great votary of employment-oriented technical education, he played an important role in the movement that maintained that 'if Hindu and Sikh youth were provided with suitable means of instruction in technical subjects, many fresh openings could be made for them and the present pressure on agriculture and the services largely diminished'. As a result, Victoria Diamond Jubilee Hindu Technical Institute was set up in Lahore in 1897 and Ruchi Ram given the honour of delivering the inaugural address. The Institute was headed by the famous poet-scientist Puran Singh during 1904 -1906. Having experienced both opulence and poverty in his childhood, Ruchi Ram was very keen to promote science as a producer of wealth. In 1934, as the President of Northern India Chemical Manufacturers' Association, he strongly objected to 'the economic resources of the province' being 'mortgaged beforehand to a foreign concern [Imperial Chemical Industries]', and wanted 'the interests of indigenous chemical industries' to be protected. A life-long adherent of the Brahmo Samaj principles, he held all religions in high esteem. In or after 1945 he wrote Struggle for Reform in Sikh Shrines, which was later edited by Dr Ganda Singh and published by the

Shiromani Gurdwara Prabhandak Committee (SGPC). With his characteristic thoroughness, he preserved all the press communiqués on the subject which SGPC had issued from time to time and subsequently presented a complete set to SGPC whose own collection had gaps. Ruchi Ram Sahni belonged to the first generation of University students in Punjab who were 'practically without any guidance from our elders'. Very conscientiously he set out to remedy this deficiency for the coming generations of students. On a personal level, he sought knowledge and strove to live in accordance with it. As member of the society, he strove even harder to apply his intellect, learning, analytical skills and organizational abilities for the benefit of his countrymen. It is in this context that he continues to be relevant today. Ruchi Ram Sahni (1863-1948) was born barely 14 years after the British annexation of Punjab and lived to see India become independent. His life thus spans a very important period of history. He was the first person from Punjab to make a career in science. He was the first Indian officer in the India Meteorological Department (1885). Moving by choice to teaching, he became the first Indian science professor at Government College Lahore which he served from 1887 till his retirement in 1918. The University instituted Ruchi Ram Sahni Declamation Contest Prize in his honour. He is also India's first nuclear scientist who published two research papers in 1915 and 1917 working in the laboratory of Ernst Rutherford in Manchester where he interacted with Niels Bohr. (Interestingly, in his laboratory work, he was assisted by his son Birbal Sahni, the well-known paleobotanist, who was at the time studying in Cambridge.) He remained a member of Punjab University Senate and of Syndicate for a number of years, till 1921. In 1923, he entered Punjab Legislative Council as a member of the Swaraj Party.

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ACKNOWLEDGEMENTS

We sincerely acknowledge financial support for the 5th IAPT National Student Symposium on Physics from the following agencies/individuals:

- Indian Association of Physics Teachers
- Department of Physics, Panjab University, Chandigarh
- Department of Science & Technology, UT Chandigarh
- Pyramid Electronics, Parwanoo

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- Vijay Singh (Mumbai)
- Tankeshwar Kumar (Hissar)

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- Rama Arora
- Vivek Kumar
- Sheojee Singh

LIST OF PARTICIPANTS

S.No.	Applicant's Name	Gender	Applicant's Institution
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2	Abhay Singh Dulta	M	Panjab University, Chandigarh
3	Agamleen Singh	M	Panjab University, Chandigarh
4	Akshay Upendra Parab	M	NCNNUM (University of Mumbai)
5	Akshdeep Kaur	F	PAU
6	Amanpreet Kaur	F	Guru Nanak College for Girls, Sri Muktsar Sahib
7	Amlesh Kumar	M	St. Xavier College, Ranchi
8	Amritpal Singh	M	PAU
9	Anjali Sharma	F	PAU
10	Arju Tiwari	F	Feroze Gandhi College, Raebareli
11	Arshdeep Kaur	F	PAU
12	Ashish Chauhan	M	Invertis University, Bareily
13	Ashish Kumar Rajayan	M	Panjab University, Chandigarh
14	Bhavya Sanghavi	M	Christ College, Rajkot
15	Chahat Gupta	F	SCD Govt. College, Ludhiana
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21	Harnoor Aulakh	F	St. Bedes College, Shimla
22	Harsh Bhardwaj	M	S.G.T.B. Khalsa College (University of Delhi)
23	Hirave Pravin Prakash	M	NCNNUM (University of Mumbai)
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30	Komal Kaur	F	Panjab University, Chandigarh
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39	Manav Goplani	M	Christ College, Rajkot
40	Manish Joshi	M	Pt. L.M.S. Govt. P.G. College, Rishikesh
41	Manpreet Kumar	M	DAV College Abohar
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43	Mohan Narasimhulu Thalla	M	S.V.U. College of Sciences, Tirupati
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45	Nainy	F	Panjab University, Chandigarh
46	Namarta Rani	F	Panjab University, Chandigarh
47	Namya Chadda	F	Panjab University, Chandigarh
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49	Navneet	M	Guru Jambheshwar University of Science & Technology, Hisar
50	Neelkath Rawat	M	S.G.T.B. Khalsa College (University of Delhi)
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53	Ninaad Desai	M	St. Xavier College, Ahemdabad
54	Nitin Ratnakar	M	Mahatma Jyotiba Phule Rohilkhand University, Bareilly
55	Om Sarveshwarpati Tripathi	M	E.C.C. Allahabad
56	Palvi	F	Guru Nanak College for Girls, Sri Muktsar Sahib
57	Prasanth K.	M	Sri Ramakrishna Mission Vidyalaya, College of Arts and Science, Coimbtore
58	Rahul Chauhan	M	Panjab University, Chandigarh
59	Rahul Jagdishbhai Vala	M	Maharaja Sayajirao University, Baroda
60	Rajpura Kenil Virenbhai	M	St. Xavier College, Ahemdabad
61	Rashim Goyal	F	MCM DAV College, Chandigarh
62	Raviraj Chandreshbhai Mandalia	M	St. Xavier College, Ahemdabad
63	Ridhima Goyal	F	Panjab University, Chandigarh
64	Rishabh Nakra	M	GNDU
65	Rohit Gaddi	M	Panjab University, Chandigarh
66	Sabhyata	F	Panjab University, Chandigarh
67	Sachin Singh	M	Gurukul Kangri Vishwavidayalaya
68	Sandhya Negi	F	Pt. L.M.S. Govt. P.G. College, Rishikesh
69	Sanjana Bhatia	F	Panjab University, Chandigarh
70	Satyam Panigrahi	M	S.G.T.B. Khalsa College (University of Delhi)
71	Shashank Kumar	M	Pt. L.M.S. Govt. P.G. College, Rishikesh
72	Sheenam	F	Panjab University, Chandigarh
73	Shees Majid Shaikh	M	Fergusson College, Pune
74	Shivangi	F	Panjab University, Chandigarh
75	Shreya Sharma	F	Panjab University, Chandigarh
76	Shruti Saini	F	Panjab University, Chandigarh
77	Shubham Bangalia	M	Panjab University, Chandigarh
78	Shubham Tiwari	M	Acharya Narendra Dev College (University of Delhi), Govindpuri, Kalkaji, New Delhi (110019)
79	Shweta Soni	F	E.C.C. Allahabad
80	Simranpreet Kaur	F	GNDU
81	Sonali Gupta	F	Panjab University, Chandigarh
82	Srashti Saxena	F	Invertis University, Bareily
83	Sunil S. Yadav	M	NCNNUM (University of Mumbai)
84	T.V. Ram Mohan	M	Manonmaniam Sundarnagar University, Tirunelveli-12
85	Tanisha Singla	F	Panjab University, Chandigarh
86	Tanvi Sharma	F	St. Bedes College, Shimla
87	Ujjval Gupta	M	Mahatma Jyotiba Phule Rohilkhand University, Bareilly

88	Vibhooti Shekhawat	F	Shiv Nadar University
89	Vikas	M	Panjab University, Chandigarh
90	Vikas Goel	M	Panjab University, Chandigarh
91	Vinay Goyal	M	Panjab University, Chandigarh
92	Vipul Atray	M	Panjab University, Chandigarh
93	Yukti	F	Panjab University, Chandigarh
94	Aneesh Agarwal	M	The Doon School, Dehradun
95	Raghav Grover	M	The Doon School, Dehradun

Schedule – 6th IAPT NSSP

4 October 2018, Thursday

Time	Activity	Speaker/s	Title
10:00-10.45	Inauguration	(Prof. Raj Kumar, Satya Prakash, N. Goyal, R.G. Pillay)	
10:45-11.15	High Tea		
11.30-12.30	Invited Talk	R.G. Pillay (IIT, Ropar)	Exploring nature of neutrinos - *Search for neutrino-less double beta decay*
12.30-13:30	Oral Session -I	Presentations (4)	O1, O2, O6, O20
13:30-14:30	Lunch		
14:30-15:45	Oral Session -II	Presentations (5)	O21, O22, O3, O14, O15
15:45-16:00	TEA		
16:00-17:00	Invited Talk	J.C. Joshi (SASE, Chandigarh)	TBA
17.00- 18.30	Poster Session -I	Posters (12)	PS-I
18.30- 19.45	Demonstration	M.S. Marwaha	Demonstration of Physics Experiments
19.45	Dinner		

5 October 2018, Friday

Time	Activity	Speaker	Title
9.30 – 11.15	Oral Session -III	Presentations (7)	O13, O5, O7, O8, O11, O16, O18
11.15-11:30	Tea		
11:30 – 12.30	Invited Talk	Arvind (IISER, Mohali)	TBA
12.30-13.30	Early Lunch		
13.30 – 17.00		VISIT to CFSL, CSIO	
17.00 -18.30	Tea & Poster Session II	Posters (12)	PS-II
18.30 -19.30	Invited Talk	Sandeep Sahijpal (Panjab University)	The story of our Universe
19.30	Dinner		

6 October 2018, Saturday

Time	Activity	Speaker	Title
9.30 -10.00	Oral Session- IV	Presentations (2)	O12, O4
10.00 – 11.00	Invited Talk	Pushpendra Singh (IIT, Ropar)	Nuclear interactions: A few answers and (a lot more) questions
11.00-12.00	Poster Session III	Posters (10)	PS-III
12.00 – 13.00	Oral Session-V	Presentations (4)	O9, O10, O19, O17
13:00-13:30	Valedictory Function		
13:30	Lunch- T.A. Disbursal		

Poster Session I – P2, P3, P7, P12, P13, P14, P17, P24, P25, P26, P31, P32

Poster Session II – P4, P5, P6, P9, P15, P16, P19, P20, P28, P29, P30, P34

Poster Session III – P1, P8, P10, P11, P18, P21, P22, P23, P27, P33

INVITED SPEAKERS

Prof. R. G. Pillay
Indian Institute of Technology, Ropar

Title of Talk: Exploring nature of neutrinos: Search for neutrino-less double beta decay

Abstract: Study of beta decay provided the first physical evidence for the existence of an elusive and exotic particle postulated by Wolfgang Pauli in 1930, and named as the neutrino by Enrico Fermi in 1932. Beta decay is a weak nuclear process in which a neutron decays to a proton, electron and an anti-neutrino. Maria Goeppert-Mayer in 1935 suggested the possibility of double beta decay: an even rarer, second-order weak nuclear transition. In nature, there are only 35 even-even nuclei in which single beta decay is forbidden or suppressed and can undergo double beta decay. In this mode ($2\nu\beta\beta$), two neutrons simultaneously undergo beta decay producing two protons, two electrons and two anti-neutrinos in the final state. The $2\nu\beta\beta$ process has been experimentally observed in 13 nuclei so far with a half-life in the range - $T_{1/2}$~10^{18} to $10^{24}y$.

In 1937, Ettore Majorana showed that the neutrino can be its own antiparticle, and as a consequence, Wendell Furry proposed in 1939, that double beta decay can proceed without the emission of any neutrinos. It is now well established that neutrinos have a non-zero mass and this fact has rekindled the fundamental question - whether the neutrino and anti-neutrino are the same (Majorana particle) or distinct (Dirac particle). Neutrino-less double beta decay ($0\nu\beta\beta$), is perhaps today the only experiment which can provide an answer to this key question. This decay mode ($0\nu\beta\beta$) violates conservation of lepton number and has implication in understanding the matter-antimatter asymmetry in the universe. Today, the study of the exotic properties of the neutrino opens a gateway to Physics beyond the Standard Model.

In this presentation, I hope to the briefly highlight the physic motivation and world-wide experimental efforts to explore the nature of neutrinos via the neutrino-less double beta decay process. I will describe the complexity and challenges in designing such experiments which require pooling of expertise across a variety of interdisciplinary areas, with particularly emphasis on the present efforts on the experiment Tin.Tin (The India-based Tin Detector), aimed to search for $0\nu\beta\beta$ in ^{124}Sn.

Prof. Sandeep Sahijpal
Panjab University, Chandigarh

Title of Talk: The Story of Our Universe

Abstract: A detailed account of the origin and evolution of our Universe during the last 13.7 billion years will be presented in the talk. The origin and evolution of galaxies, starts, the chemical elements and the planetary systems will also be discussed.

LIST OF ORAL PRESENTATIONS

ID	Applicant's Name	Applicant's Institution	Title of Presentation
O1	Harishchand S. Nishad	NCNNUM (University of Mumbai)	SOLAR E-GEYSER
O2	Vibhooti Shekhawat	Shiv Nadar University	CIRCUIT ELEMENTS USING GRAPHITE LINES AND THEIR APPLICATIONS
O3	Harnoor Aulakh	St. Bedes College, Shimla	SCIENTIFIC VISUALIZATION OF PHYSICS CONCEPTS
O4	Lav Kumar Jha	St. Xavier College, Ranchi	ARTIFICIAL INTELLIGENCE AND THE FUTURE OF ENERGY
O5	Shashank Kumar	Pt. L.M.S. Govt. P.G. College, Rishikesh	NUCLEAR RADIATION MEASUREMENT USING THERMOLUMINESCENCE TECHNIQUE
O6	Sandhya Negi	Pt. L.M.S. Govt. P.G. College, Rishikesh	STUDY OF INTERFACE LAYER AND FABRICATION OF PEROVSKITE SOLAR CELL (PSC)
O7	Manish Joshi	Pt. L.M.S. Govt. P.G. College, Rishikesh	STUDY OF THERMOLUMINESCENCE PROPERTY OF HIMALAYAN STONES FOR NUCLEAR RADIATION MEASUREMENT
O8	Aastha Bhatt	Pt. L.M.S. Govt. P.G. College, Rishikesh	STUDY OF INTERFACE LAYER AND DEVICE FABRICATION OF ORGANIC SOLAR CELLS
O9	Shweta Soni	E.C.C. Allahabad	FOURIER TRANSFORM AND ITS APPLICATION IN COMMUNICATION
O10	Divyang Rainkamal Prajapati	St. Xavier College, Ahemdabad	ECF v1.1 - ELECTRIC FIELD CODE FOR FILAMENT
O11	Om Sarveshwarpati Tripathi	E.C.C. Allahabad	PHYSICAL INTERPRETATION AND APPLICATIONS OF MAXWELL'S EQUATIONS
O12	Jebin Larosh J.	Manonmaniam Sundarnagar University, Tirunelveli-12	LONG STRING LIKE OBJECTS AS GALACTIC DARK MATTER
O13	Ninaad Desai	St. Xavier College, Ahemdabad	A STUDY IN PLASMA CHARACTERISTICS AND PLASMA–ION PROPULSION
O14	Mayank Sharma	SCD Govt. College, Ludhiana	FIBONACCI NUMBERS
O15	Rajpura Kenil Virenbhai	St. Xavier College, Ahemdabad	SPECTRAL ANALYSIS – GLEAMING INFORMATIONS FROM THE STARS
O16	Raviraj Chandreshbhai Mandalia	St. Xavier College, Ahemdabad	EFFECT OF SIZE AND SHAPE ON BAND GAP OF NANO-SOLIDS
O17	Agamleen Singh	Panjab University	STUDY OF LIGHT POLLUTION WITH VARIOUS STREET LAMPS
O18	Enosh Sinha	Panjab University	PRINTING IN HIGHER DIMENSIONS
O19	Ashish Kumar Rajayan	Panjab University	POST CRASH QUICK RESPONSE: A LIFE SAVIOUR
O20	Vipul Atray	Panjab University	RECENT INNOVATIONS IN ENERGY STORAGE TECHNOLOGIES AT QUANTUM SCALES

O21	Komal Kaur	Panjab University	SCIENCE BEHIND OUR VERY OWN CANDLES
O22	Rahul Grover	The Doon School, Dehradun	ON THE VELOCITY OF A WEIGHTED CYLINDER DOWN AN INCLINED PLANE

LIST OF POSTER PRESENTATIONS

PID	Applicant's Name	Applicant's Institution	Title of Presentation
P1	Hirave Pravin Prakash	NCNNUM (University of Mumbai)	DESIGNING OF LOW COST, EASY TO HANDY AND RECHARGEABLE LIGHTING SYSTEM FOR RURAL APPLICATIONS
P2	Akshdeep Kaur	Punjab Agricultural University, Ludhiana	DETERMINATION OF MOISTURE CONTENT IN WHEAT (TRITICUM AESTIVUM L.) WITH 120 KG HA-1 NITROGEN LEVEL USING BETA RADIATIONS
P3	Arshdeep Kaur	Punjab Agricultural University, Ludhiana	DETERMINATION OF MASS ATTENUATION COEFFICIENT OF OAK (GREVILLEA ROBUSTA) WOOD SAMPLE USING GAMMA RADIATIONS
P4	Anjali Sharma	Punjab Agricultural University, Ludhiana	KORTEWEG DE VRIES EQUATION OF ELECTRON ACOUSTIC SOLITARY WAVES FEATURING CAIRNS-TSALLIS DISTRIBUTION OF ELECRONS
P5	Kirandeep Kaur	Punjab Agricultural University, Ludhiana	ARBITARY AMPLITUDE ELECTRON-ACOUSTIC SOLITARY WAVES WITH CAIRNS-TSALLIS ELECTRONS
P6	Navjot Kaur	GNDU	NEUTRINO OSCILLATIONS
P7	Amritpal Singh	Punjab Agricultural University, Ludhiana	CONTROL SAMPLE STUDUES FOR RARE RADIATIVE DECAY USING BELLE DETECTOR
P8	Navneet	Guru Jambheshwar University of Science & Technology, Hisar	LASER COOLING
P9	Manpreet Kumar	DAV College Abohar	TIME - AN UNDEFINABLE SCALAR
P10	Arju Tiwari	Feroze Gandhi College, Raebareli	BEHAVIOUR AND PROPERTIES OF NANOMATERIALS
P11	Nimarpreet Kaur	Guru Nanak College for Girls, Sri Muktsar Sahib	UNDERSTANDING SUPERHYDROPHOBICITY
P12	Loveleen Wadhwa	Guru Nanak College for Girls, Sri Muktsar Sahib	URANIUM IN GROUNDWATER OF MALWA REGIONS
P13	Palvi	Guru Nanak College for Girls, Sri Muktsar Sahib	RAYLEIGH SCATTERING CROSS SECTIONS OF 59.54 KEV ENERGY PHOTONS IN ELEMENTS $1 \leq Z \leq 92$ (THEORETICAL APPROACH)
P14	Amanpreet Kaur	Guru Nanak College for Girls, Sri Muktsar Sahib	COMPARATIVE STUDY OF KOH AND TMAH ETCHING OF Si (100)
P15	Ashish Chauhan	Invertis University, Bareily	THE DUAL NATURE OF LIGHT AND MATTER
P16	Manav Goplani	Christ College, Rajkot	MYSTERIES OF COSMOLOGY
P17	Bhavya Sanghavi	Christ College, Rajkot	QUARK-GLUON PLASMA

P18	Srashti Saxena	Invertis University, Bareily	IMPORTANCE OF ENERGY HARVESTING TECHNOLOGIES
P19	Rishabh Nakra	GNDU	STELLAR EVOLUTION: FROM INTERSTELLAR CLOUDS TO BLACK HOLES
P20	Simranpreet Kaur	GNDU	GALACTIC NEBULAE
P21	Harsh Bhardwaj Neelkath Rawat Satyam Panigrahi	S.G.T.B. Khalsa College (University of Delhi)	EXPERIMENT TO MEASURE g ELECTRONICALLY
P22	Shees Majid Shaikh	Fergusson College, Pune	DIFFERENT METHODS OF DAY-LIGHTING AND THEIR COST-EFFECTIVENESS
P23	Madhu Sudan	Panjab University	KINGDOM OF 3D-PRINTING
P24	Nainy Jasmeen Kaur Rohit Gaddi Lovish	Panjab University	ATOMIC CLOCK
P25	Tanisha Singla Abhay Singh Dulta Sabhyata Vikas	Panjab University	CLOUD CHAMBER: REMOTE METHOD FOR PARTICLE DETECTION
P26	Shivangi Jatin Singh Molly Sharma	Panjab University	DETECTION OF ALPHA PARTICLES USING SPARK COUNTER
P27	Sheenam Limcy Neha Namarta Rani	Panjab University	A SHORT INTRODUCTION TO LASER PHYSICS
P28	Sanjana Bhatia Kanishk	Panjab University	COMPARING QUANTUM KEY DISTRIBUTION PROTOCOL WITH CURRENT CRYPTOGRAPHIC SCHEMES
P29	Vikas Goel	Panjab University	TECHNOLOGIES IN QUNATUM REALM
P30	Rahul Chauhan	Panjab University	IDEAS LEDAING EVOLUTION IN QUANTUM PHOTONICS
P31	Shruti Saini Namya Chadda Ekjot Kaur	Panjab University	POSITRON EMISSION TOMOGRAPHY
P32	Shreya Sharma Komal Singh	Panjab University	NEW AGE POWER GENERATION THROUGH NUCLEAR BATTERIE
P33	Ridhima Goyal Diya Bansal Shubham Bangalia Sonali Gupta	Panjab University	NATURE WONDERFUL “AURORA”
P34	Vinay Goyal Yukti	Panjab University	QUANUM ENTANGLEMENT: INTRODUCTION AND ITS IMPLICATIONS

ABSTRACTS OF ORAL PRESENTATIONS

O-1: SOLAR E-GEYSER

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Abstract: Usually electric geyser's required AC current and solar geysers are basically working on thermal heating principle. In this project, we have successfully demonstrated low cost, smaller size, user free, Eco-friendly and efficient e-geyser operated on DC current. The solar panel generated electricity were used to recharge a battery. Further the battery output were given to a geyser. It has reduced risk of current shocks while heating due to DC current. It can be easily used in large scale heating systems especially at remote places, at border region, public places etc. This scientific concept is applicable to other related systems as well such as hot plates used for cooking, coffee makers, chapatti makers and so on. In addition, we have integrated water level detector system in order to get indication of amount of water. This will help to control heating load as well as heating time.

O-2: CIRCUIT ELEMENTS USING GRAPHITE LINES AND THEIR APPLICATIONS

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Abstract: This is a very simple innovative experiment which students will enjoy doing. Despite of its simplicity, we can verify various numbers of basic laws of electrical circuits. The things needed to perform this experiment are just some shading pencils, paper and an LCR meter. Shading pencils, being composed of the mixture of graphite and clay, are able to conduct electricity and can be used in constructing and exploring different circuit elements. In this experiment, graphite pencils are used because these are very cheap and can be used for demonstration purposes. Different demonstrations can be held in schools for explaining simple laws of combination of different circuit elements. In this project, my aim is to show the dependence of resistance and capacitance on different physical parameters and experimentally calculating the value of π electrically. Multiple attempt have led to the verification of dependence of resistance on the length, width of shaded line and grade of used pencil and the relation of capacitance with the common shaded region. A resistance can be constructed by drawing a line of some width on a paper. The lines of different lengths and widths will have different resistance. A capacitor can be constructed by shading a paper from both the sides where the common shaded area will behave as the two plates and the paper will behave as the dielectric between them. The method used for the calculation of π involves only the electrical measurements and not any physical measurement.

O3: SCIENTIFIC VISUALIZATION OF PHYSICS CONCEPTS

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Abstract: We know when we visualize something we understand it better and can also memorize it for longer period. Therefore, visualizing physics is very crucial to understand the data more efficiently. One way to visualize data is through graphs which help us compare and evaluate values. Since my high school days I always wondered how graphs were digitally plotted. My queries were answered when I was introduced to GNUPLOT. In this paper a case study is done to throw light upon how gnu plot helps visualize physics experiments with more accuracy and precision.

O4:ARTIFICIAL INTELLIGENCE AND THE FUTURE OF ENERGY

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Abstract: The dynamic growth in the energy sector and its increased applicability represents some undergoing scenario that we will discuss. The efficiency of Utilities can be increased by using more artificial intelligence (AI) technology, such as software to predict demand swings in the power grid or to control home appliances. Power firms, which previously depended on coal or gas-fired power plants, are having to adapt to the expanding use of renewable power sources and facing a profit squeeze as wholesale electricity prices have fallen. Companies need to respond to this change and come up with new business models. To do that they need new technologies such as artificial intelligence. The rise of renewables, such as solar and wind that provide intermittent supply, has increased the need for intelligent IT systems to balance demand and supply swings as companies seek to meet energy and carbon emissions targets. AI could be used heating, lighting and other household appliances to help them adapt to the daily habits of consumers and use energy more efficiently. In the present topic we are going to deal with utilization of artificial intelligence in each sector of energy and how will they are going change the management of energy, its production and effect on environment.

O5: NUCLEAR RADIATION MEASUREMENT USING THERMOLUMINESCENCE TECHNIQUE

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Abstract: In this study, the standard thermolminescence (TL) dosimetric material (CaSO4:Dy) in the form of Teflon discs have been studied for their thermoluminescence property. The TL sensitivity of the CaSO4:Dy Teflon discs has been investigated while irradiating them with gamma radiation emitting from 60Co radioactive source. The discs were calibrated with different radiation exposure and the unknown radiation exposure was estimated using this method. CaSO4;Dy discs were collected from the 'Defence Laboratory DRDO, Jodhpur' in the form of Teflon discs which were annealed by putting them in an oven for 4 to 6 hours at 300 0C. The TL integral count and TL glow curve of the discs were recorded by a TLD Reader. On the basis of the obtained data from our observations using TLD Reader the TL sensitivity of CaSO4:Dy in units

of AU/R/mg were estimated. The percentage error in unknown dose estimation using CaSO4:Dy TL material is found to be within 10%, which is acceptable for radiation protection dose estimation. Future prospects of the CaSO4:Dy Teflon discs were also discussed.

O6: STUDY OF INTERFACE LAYER AND FABRICATION OF PEROVSKITE SOLAR CELL (PSC)

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Abstract: Perovskite solar cells based on organometal halide light absorbers have been considered as a promising photovoltaic technology due to their superb power conversion efficiency (PCE) along with very low material costs. Since the first report on a long-term durable solid-state perovskite solar cell with a PCE (Power conversion efficiency) of 9.7% in 2012, a PCE as high as 19.3% was demonstrated in 2014, and a certified PCE of 17.9% was shown in 2014. Hence in present study Perovskite Solar cells of the structure ITO/PEDOT: PSS/CH3NH3PbI3/LiF/Al (Inverted structure) has been investigated. Fabrication of such cells involve cleaning the substrate, spin coating and deposition of the material over the substrate through thermal evaporation technique. After fabrication of solar cell, J-V characterization of these cells were carried out to determine the device parameters such as Power Conversion Efficiency (PCE), open circuit voltage (Voc), Fill Factor (FF), and short circuit current density (Jsc). Fabrication of the perovskite solar cells using inverted device structure ITO/PEDOT: PSS/CH3NH3PbI3/LiF/Al was demonstrated and the efficiency of 0.80% was achieved.

O7: STUDY OF THERMOLUMINESCENCE PROPERTY OF HIMALAYAN STONES FOR NUCLEAR RADIATION MEASUREMENT

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Abstract: In this work, the Thermoluminescence(TL) property of Himalayan stones(Natural stone)were investigated for their likely applications in nuclear radiation measurement. Twenty six (26) natural stones sample of size varying from 50-100gm and different colors were selected from the bank of river Gangaat Rishikesh, in a clean carry bag. Powder samplesofsize150-212μm were prepared from each stone samples. The prepared powder samples(eachweighing50mg) were divided into two parts, one part kept for background measurement and the other part of samples were positioned at 20cm from the 60Co radiation and irradiated for calculated exposure time 47min for 300R exposures. The TL integral count and TL glow curve of the samples were recorded by Nucleonix TLD Reader. On the basis of given information by TLD Reader the TL sensitivity of Himalayan stones was discussed in terms of AU/R/mg and Natural Radiation exposure in Himalayan stones was estimated. The future Prospects of higher sensitive stones were also discussed.

O8: STUDY OF INTERFACE LAYER AND DEVICE FABRICATION OF ORGANIC SOLAR CELLS

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Abstract: The Research interest of Organic Bulk Hetrojunction (BHJ) solar cell has significantly improved over the past few years due to their potential for fabrication of light weight and low cost devices. In this work BHJ solar cells of the structure ITO/PEDOT:PSS/PTB7:PCBM/LiF/Al and ITO/ZnO/PTB7:PCBM/MoO3/Al were investigated. Fabrication of such cells involve cleaning the substrate, coating and deposition of the material over the substrate by spin coater (glove box) and thermal evaporator. On the basis of given information, I-V characterization of these cells are carried out to determine the device parameters such as Power Conversion Efficiency (PCE), open circuit voltage (Voc), Fill Factor(FF), and short circuit current (Jsc). We got the best device with efficiency of 4.32% (converted organic solar cell) & 1.58%(Inverted organic solar cell). Here in it is observed that the change of interface layer change the structure of device from conventional to inverted one & the device parameters also change, Usually inverted device has better parameters. However, in our case conventional have better device parameter.

O9: FOURIER TRANSFORM AND ITS APPLICATION IN COMMUNICATION

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Abstract: Fourier transform is a special integral transform that transforms the signal from time domain to the frequency domain. Signal is basically a means of transmitting information in accordance with certain pre-arranged system or code. Fourier analysis has always been used in signal processing which is widely used in mobile communication. Through the modulation of the signal can be low frequency components of the signal modulation to high frequency, to improve the noise resistance, is conducive to long distance transmission of the signal. Fourier transform is used to realize the filtering, modulation and sampling of the signal. The signal sampling can be continuous signal discretization, help to used the computer to deal with signal simply. Fourier transform plays a very important role in signal processing, voice communication, sonar, earthquake, many more fields. Learning of Fourier transform is the basis for learning other frequency domain transformation.

O10: ECF v1.1 - ELECTRIC FIELD CODE FOR FILAMENT

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Abstract: The new code ECF v1.1 is developed to simulate the electric fields generated by filaments of finite length and uniform charge distribution. The design philosophy of ECF v1.1 is to reduce complexities while generating inputs and to provide visuals of given inputs to the user. For that ECF v1.1 creates 3D plots of a filamentary system and direction vectors of simulated electric field as an output.

O11: PHYSICAL INTERPRETATION AND APPLICATIONS OF MAXWELL'S EQUATIONS

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Abstract: During the philosophical transactions at Royal Society in 1865, J. C. Maxwell proposed a quite new idea about the light in his research paper " A dynamical theory of the electromagnetic field" . The four equations that the world seen firstly, called the equations of light or Maxwell's equations, are the vector differential equations that showed us how to electrify the world and transmit the energy and information through air. As they are mathematical relationships, more likely vector differential equations, are interpreted physically assuming that the fields are invisible fluids in space. A vector differential operators shows the kind and amount of variation of field with space and time, when they operated on electromagnetic fields, these equations tells us how these fields are going to behave with variations in space and time. Once we interpret physically these variations, we can apply these equations as our need, and it may a key for some great innovations. At the start of the 18th century we lit our homes and offices with candles and oil lamps, communication took in the form of handwritten letters , as they took days to travel across country and several weeks across ocean. Today we use electricity to power almost everything and radio waves to communicate, instantaneously. The seeds of this enormous change were planted in 1865, when Maxwell thinked in a radically new way about the unification of electric and magnetic fields. These equations are used design and analysis of a broad span of objects like weapons, cooktops, oven, transformers, touch screen technology, electromagnetic trains etc. Learning the physical interpretation of these equations are the basis for their applications.

O12: LONG STRING LIKE OBJECTS AS GALACTIC DARK MATTER?

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Abstract: A classical long string in TGD (topological geometrodynamics) is the analogy of cosmic string and thickens during cosmic evolution to magnetic flux tube. Its properties allow to understand the galactic dark matter and the dynamics of distant stars. Flat velocity spectrum and gravitation of TGD strings are sketched.

O13: A STUDY IN PLASMA CHARACTERISTICS AND PLASMA–ION PROPULSION

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Abstract: In the present work, I have established and diagnosed some of the basic characteristics of plasma, such as relation between discharge voltage and pressure, plasma under external magnetic field and other individual experiments which comprise the present work. Also, a simple and innovative model of an ion-propulsion engine has been developed for diagnostics and future demonstration purposes.

O14: FIBONACCI NUMBERS

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Abstract: Fibonacci numbers, though a mathematical series, appear everywhere in nature covering a wide spectrum from flower , bees, rabbits, cones to galaxies to vortices explaining everyday phenomenon like drainage system. And also show magical behavior in lot of aspect of mathematical phenomenon. Next, we discuss the matrix formulation of Fibonacci numbers connecting dots to Pascal's triangle. Talking about eigen values being golden ratio might help in physical significance to Eigen value problem. On parallel lines, we discuss Bibonacci, Tribonacci and n-bonnaci sequences and relation with silver, bronze and n metallic ratios.

O15: SPECTRAL ANALYSIS – GLEAMING INFORMATIONS FROM THE STARS

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Abstract: It is difficult to obtain spectral analysis on the surface of the celestial body. But, we can analyse the emitted photon which is coming from that celestial object, carrying information of its chemical composition, temperature, density, mass, luminosity, and relative motion using Doppler shift measurements. In the present work, a spectral analysis of star light using a software named "RSpec" is discuss. The important features of this analysis are that using Digital Signal Lens Reflex (DSLR), one can explore the celestial body.

O16: Effect of Size and Shape on Band gap of Nano-solids

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Abstract: In the present study a simple theoretical model has been discussed for computing band gap of semiconducting nano-solids having different shapes based on size dependent atomic cohesive energy. We have considered nano Germanium and Silicon for the study of size- and shape-dependent band gap energy. It is found that the band gap energy of nano-solid Germanium and Silicon depends upon the particle size and shape. The model predicts that the band gap energy increases as particle size of the semiconductor nano-materials decreases.

O17: STUDY OF LIGHT POLLUTION WITH VARIOUS STREET LAMPS

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Abstract: Light pollution in India is a matter of great concern. It has become an all pervasive intrusion into city/town life. There is a large variation in LP level for Indian cities/towns which are related to demographic and socio economic factors with a few exceptions. However there isn't much awareness about the issue. Hence various aspects related to LP should be brought to the notice of common people. Measuring the total amount of light pollution in certain area is very difficult and complex procedure because the natural atmosphere is not completely dark. The prime objective of this particular experiment was to measure the amount of light going in the sky from each of these luminaries. We designed an arrangement with the bulbs along with the casings used to suspend them, to know the amount of light pollution caused by each of them. The perfect angle to suspend the luminaries being 0 degree was used to know the minimum light pollution possible from each luminary. To study the light pollution levels, the most used street lamps are selected so that we can cover substantial share of luminaries (in absolute terms) across India. Thus, the selected fixtures are descripted are High Pressure Sodium Bulb (HPS), Light Emitting Diode (LED) and Tungsten Halogen. The performance of a lighting unit can be shown by diagrams depicting the distribution of illumination. The method used in this experiment is the zonal cavity method or lumen method. With the experiment, various data sets were recorded with which some significant conclusions were drawn. Apart from calculating the Upward Light Ratio, the respective spectrum of the fixtures was also studied, emphasising the blue spectrum. In addition to this biological aspects of light pollutions were also studied.

O18: PRINTING IN HIGHER DIMENSIONS

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Abstract: New thinking has been a compelling source to create new sciences and hence new technologies. In the same line, printing in higher dimensions is emerging to put its technological signatures. 3 dimensional (3D) printing is a process in which a 3 dimensional object is fabricated by depositing layers of the material, one over the other in a successive manner from a digital file. 3D printing techniques include melting, drop by drop deposition or hardening of photo reactive resins using UV rays etc. While, 4 dimensional (4D) printing is a renovation of 3D printing which has focus on methods of generating objects capable of mechanical deformation on application of triggers like heat, light, field or some other form of energy etc. Here, we are looking for presenting the various recent methodologies along with a mention of different new materials coming on screen to push these printing schemes to model multi dimensional objects made up of plastic, metal or even human tissues. This review is being accommodated with applications of above mentioned techniques in areas of education, aerospace, biomedical and fashion technologies etc.

O19: POST CRASH QUICK RESPONSE: A LIFE SAVIOUR

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Abstract: The developments in the field of technology are equipped with innovations and creativity, which are leading to a whole new face of developing world. Many advanced machines are invented in different parts of world giving rise to either decrease in manpower or resulting in comfortability and ease of access for humans. To enjoy such technological outcomes, safety of humanity must be handled with an extreme care. Here, we come forward to put an analysis on an innovative project having theme towards saving lives immediately after accidents, if happens, for some reasons. This rescue operation basically focuses on automatically unlocking the doors and opening the windows of a vehicle, say, car, in case of an accident.

O20: RECENT INNOVATIONS IN ENERGY STORAGE TECHNOLOGIES AT QUANTUM SCALES

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Abstract: Energy is a fuel to accelerate a technology. Therefore, storage of energy on healthy scales and using it with care, demands attention. Recent decades have displayed great amount of progresses in development of energy storage devices. Here, we intend to present a review on current breakthroughs appeared in batteries starting from lithium ion, lithium sulphur to quantum batteries. This work has absorbed the details of various aspects significant enough to understand the mechanism at fundamental scales, leading to enhancement of performance of these devices.

O21: SCIENCE BEHIND OUR VERY OWN CANDLES

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Abstract: The aim of the presentation will be to look deeper into the science behind the making and working principles of candles. We all see, and use candles every now and then, but there's a lot more to know and understand, that is usually not noticed or questioned by us. Some general but interesting questions that will be considered in my talk are: the material used for making candles, governing science, the effect of various factors on the flame, various colors of a candle flame and their meaning and the shape of the flame. These simple candles and the science behind them, is of great interests to scientists today. One of the major evidences of this is that scientists are so fascinated by the beauty of a candle that scientists at NASA, one of the major science organizations took their research on candles to a different level. They have conducted space shuttle experiments to learn about the behavior of candles in microgravity. A J- type thermocouple can be used to conduct experiments to find effect of parameters on the burning of a candle due to size of wicks, to know whether there exist a constant temperature in the heating of flame. A J- type thermocouple produces temperature dependent voltage due to thermoelectric

effect, which is further used to measure temperature. Then finally we discuss in brief the about Luminar C which is an eco friendly and does not require any source for its operation. Thus there is a lot of science going on inside as well as outside a candle which can help us understand many principles of physics in detail. I will aim to illustrate the same through my talk.

O22: ON THE VELOCITY OF A WEIGHTED CYLINDER DOWN AN INCLINED PLANE

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Abstract: A hollow cylinder consisting of a PVC pipe with a straw filled with sand stuck along its length on its inner surface, causing uneven distribution of mass, was rolled down an inclined plane surface. The video of the motion was captured using a slow motion camera and analysed using (Open Source Physics) Tracker software. The geometric centre of the weighted cylinder was tracked and the velocity-time graph was modelled using the equation of a cycloid.

ABSTRACTS OF POSTER PRESENTATIONS

P1: DESIGNING OF LOW COST, EASY TO HANDY AND RECHARGEABLE LIGHTING SYSTEM FOR RURAL APPLICATIONS

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Abstract: Along with the problem of deprivation of electricity in tribal and rural areas of India, people leaving in these areas are unable to fulfill their basic needs such buying affordable a bulbs or tube lights. In order to address these issue, researcher have demonstrated use of light emitting diodes (LEDs) to fabricate bulbs and tubes. Wide use of LEDs are due to many of its advantages which include very low cost, longer lifetime, reduced power consumption, zero mercury use and high intensity of light. However working under high intensity LED sources may cause damage to the retina of an eye. It is well known that bigger and brighter the illumination source, the more potential risk to the retina of an eye. Parallel to this, radiations from LEDs are directional. In order to get address these typical issues, LED bulb manufactures have used various types of reflectors, coatings and bulb geometries to reduce the intensity of LEDs and disperse the light emitted. However it mutated in increasing the cost of the product making LED bulb buying unaffordable especially people under poverty line. Moreover working and reading under such existing LED bulbs are observed to have complains such as headaches and some strain on eyes. Addressing these complains and safety of eyes especially children's from these areas, we demonstrate affordable, rechargeable and handy source of light made up of LEDs with special material and coating which enable uniform dispersion of light along with tolerable light intensity in order to protect human eyes and reduce complains such as headache, etc.

P2: DETERMINATION OF MOISTURE CONTENT IN WHEAT (TRITICUM AESTIVUM L.) WITH 120 KG HA-1 NITROGEN LEVEL USING BETA RADIATIONS

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Abstract: Moisture content of wheat with 120 kg ha-1 nitrogen level under different irrigation treatments has been estimated using mass attenuation coefficient and β-transmitted intensity using 204Tl as radioactive source with end point energy 0.766 MeV. Logarithmic relative intensity versus thickness curves were plotted for fresh and dry state of leaves under Staged based, water stress and pan evaporation irrigation scheduling. It was observed that mass attenuation coefficient is more for dry leaves than for fresh leaves. It showed that moisture content in wheat leaves under stage-based irrigation is 69.27%, under pan evaporation is 58.26% and under water stress approach is 48.89%. The obtained results of moisture content were compared with direct weighing method and were in good agreement. Beta attenuation technique is beneficial to estimate the moisture content because of its non-destructive nature and can be used in irrigation scheduling.

P3: DETERMINATION OF MASS ATTENUATION COEFFICIENT OF OAK (GREVILLEA ROBUSTA) WOOD SAMPLE USING GAMMA RADIATIONS

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Abstract: Due to the availability and particular features, wood was one of the first materials used by mankind with a wide variety of applications. Changes in moisture content lead to changes of virtually all physical and mechanical properties (e.g. shrinkage or swelling, strength and stiffness properties) of wood. The present study deals with the determination of mass attenuation coefficient of Oak(Grevillea robusta) wood sample at varying moisture levels using gamma ray transmission method. NaI(Tl) scintillation detector and a radioactive source 137Cs of energy 0.662 MeV was used. Wood samples were placed in oven for fixed durations to vary moisture levels. The measured relative transmitted intensities were plotted against thickness of wood samples and obtained mass attenuation coefficient from the slopes of plots at different moisture levels. The obtained mass attenuation coefficients were plotted against the relative moisture content of wood samples and it varies linearly as attenuation increases with decreasing moisture content i.e., the mass attenuation coefficient was minimum for completely wet state and maximum for oven dry state(state where density of the sample becomes constant) of the samples. The mass attenuation coefficient lies in between 0.0646 to 0.07484 as moisture content varies from 101.5494% to 0%.

P4: KORTEWEG DE VRIES EQUATION OF ELECTRON ACOUSTIC SOLITARY WAVES FEATURING CAIRNS-TSALLIS DISTRIBUTION OF ELECRONS

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Abstract: Electron acoustic solitary waves (EASWs) exist in plasma due to mutual coexistence of cool and hot electrons. In the present investigation, the problem of electron acoustic solitary wave (EASWs) propagation in a plasma with the hot electrons featuring the Cairns-Tsallis distribution is addressed. Using standard Reductive Perturbation Method, and stretching co-ordinates, the nonlinear equation named Korteweg-de Vries (KdV) equation has been derived. The derived KdV equation depends upon the parameters- q (non-extensive) and α (non-thermal). A physically meaningful non-extensive, non-thermal velocity distribution is outlined. It is shown that the effect of non-thermal non extensivity on electron acoustic waves can be quite important. The amplitude and nature of solitary waves depends sensitively on the parameters q and α. For the limit q→1, the Cairns-Tsallis distribution minimizes to cairns distribution and for α=0, the Cairns-tsallis distribution reduces to pure tsallis distribution.

P5: ARBITARY AMPLITUDE ELECTRON-ACOUSTIC SOLITARY WAVES WITH CAIRNS-TSALLIS ELECTRONS

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Abstract: Plasma is an ionized gas, considered as fourth state of matter as it possesses entirely different properties from other three states of matter. Plasma is quasineutral electrically conducting fluid. Due to its conducting nature, a large number of waves can be generated in plasma. Electron acoustic solitary waves may occur in plasma characterized by co-existence of two different electron populations, referred as "cold" and "hot" electrons. These are electrostatic waves of high frequency. The dynamics of the wave is governed by the electrons. The cold electrons provide inertia while restoring force comes from hot electron pressure. A theoretical investigation is carried out to study electron acoustic solitary waves in multicomponent plasma consisting of cold fluid electrons, hot electrons and ions. The distribution functions of electrons obey nonthermal- nonextensive distribution. In this cairns-type "nontheramal" combines with tsallis form "nonextensive". The ions are assumed to follow stationary background. The influence of the nontheramal hot electrons on present plasma model is investigated. The sagdeeev pseudo potential method had been used for this analysis. The Sagdeev potential is obtained by solving an algebraic equation. The sagdeev potential depends upon parameter ( ) and (q). The parameter ( ) stands for number of nontheramal electrons. The parameter (q) stands for strength of nonextensivity. The existence of solitary wave comes within the range of allowable mach number. The computation of the problem is in progress.

P6: NEUTRINO OSCILLATIONS

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Abstract: Neutrino oscillation is a quantum mechanical phenomenon whereby a neutrino created with a specific lepton flavour (electron, muon or tau) can later be measured to have a different flavour. The probability of measuring a particular flavour for a neutrino varies between 3 known states as it propagates through space. First predicted by Bruno Pontecorvo in 1957, neutrino oscillation has since been observed by a multitude of experiments in several different contexts. The experimental discovery of neutrino mass, by Takaaki Kajita of the Super-Kamiokande Observatory and Arthur B McDonald of the Sudbury Neutrino Observatories was recognised with 2015 Nobel Prize in Physics. In the poster, I will present neutrino oscillations, observations on solar neutrino oscillation, atmospheric neutrino oscillation, reactor neutrino oscillation, beam neutrino oscillation and theory of neutrino oscillations with diagrams and graphs. I will also present 1. Ratio of data from Super- Kamiokande to Monte Carlo expectation assuming no oscillation, as a function of reconstructed L/E. 2. Layout of SNO detector with PMT support structure (PSUP) shown inside the SNO cavity, surrounding the acrylic vessel, with light water and heavy water volumes. 3. Fluxes of B(Atomic number 8) solar- neutrinos from SNO and SK. 4.Two neutrino probabilities in vacuum. So there will be an overview on neutrino oscillations with graphs and figures.

P7: CONTROL SAMPLE STUDUES FOR RARE RADIATIVE DECAY USING BELLE DETECTOR

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Abstract: Since the revolutionary discovery of J/ψ meson, charmonium states have played a crucial role in understanding fundamental interactions. The charmonium states are of great interest both from theoretical and experimental points of view because of their clear experimental signature and great simplification caused by their non-relativistic nature. The charmonium production involves physics at both perturbative and non-perturbative energy scales and provides one of the more manageable processes for QCD calculations. Precise measurements of the inclusive branching fractions for B meson decays to different charmonium states provide sensitive tests of these models. Measurements of B decays to charmonium are also important ingredients in the study of b-quark production in hadronic interactions. Decays of B meson to final states that include charmonium states play an important role in the study of CP violation at B-factories. The branching fractions for the B → charmonium decays can provide valuable information on their decay mechanism. Here, inclusive production of J/ψ using a data sample of 772 X 106 B(B)¯events which have been collected at ϒ(4S) resonance (bound state of bb¯ quarks) with Belle detector at KEKB asymmetric energy e^- e^+ collider is measured and obtained branching fraction is B(B^0→J/ψπ^0) = (1.55 ± 0.10)* 〖10〗 ^(-5) %. To take into account the difference between real data and MC sample, the signal shape parameters are calibrated with the control sample before real data fit. In final data sample, the PDF of the signal B^0→J/ ϕ γ is differentiated from background by using an appropriate control sample B →J/ ϕ π ^0 and signal MC.

P9: TIME - AN UNDEFINABLE SCALAR

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Abstract: In this presentation I talk about TIME. As we know that the time has a very important role in our daily life.In universe time exist from starting, even before big bang but according to human curiosity they think that the arrow of time starts from big bang and it is uniformly increases till now. Till now there is no evidence that time flows back. In this presentation I also talk about the methods of measuring time i.e. what are ancient methods of measuring time and what are modern technique of measuring time. Here we discuss some properties of time like it is real or virtual, a variable or constant, absolue or relative. It is also the part of question how to measure the exact time at any place. As we know that the occurring of some phenomenon also depends on time. So time plays an important role in physical science specially in measurmentation of observations. In this we also discuss about space time fabrication, how space is related to time, how time is related to speed of the particle. No doubts we are go far away in the field of physics ,we have a lot of advancement but still today there are many more mysteries of time which are unexplainable.

P10: BEHAVIOUR AND PROPERTIES OF NANOMATERIALS

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Abstract: Materials of which a single unit is sized at least one dimension i.e., between 1 and 1000 nanometers(10^{-9}m) but is usually 1-100 nm. Two types of nanomaterials are they are natural nanomaterials and synthetic nanomaterials. Synthetic nanomaterials are again 2 types; fullerenes and nanoparticle. Nanomaterials research takes a materials science-based approach to nanotechnology. Nanoscale materials are two small and we can not see with our naked eyes and even with microscopes and those nanomaterials are called as engineered nanomaterials and they have unique optical electronic, or mechanical properties.

P11: UNDERSTANDING SUPERHYDROPHOBICITY

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Abstract: Superhydrophobic surfaces these days are of great utility due to their various applications such as self-cleaning, water repellency, anti fog, quick drying etc. But these superhydrophobic surfaces are inspired from nature. There are many examples in nature which exhibit natural superhydrophobicity. For example, Lotus Leaf, cicada wings etc. Lotus leaf has contact angle of 162° and contact angle hysteresis less than 10°. Many other plants can also be seen having contact angle more than 162° but lotus leaf has more stability and perfection in water repellency due to unique shape of papillae and high density of papillae. Similarly, for a cicada wing contact angle is 76.8°-146° and contact angle hysteresis of less than 5°.The maximum contact angle achieved artificially is 178.9° of PTFE (polytetrafluoroethylene) substrate. This paper aims at comparing superhydrophobic surfaces generated artificially with natural superhydrophobic surfaces.

P12: URANIUM IN GROUNDWATER OF MALWA REGIONS

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Abstract: SOURCES OF URANIUM - It was first predicted that the sources of uranium in groundwater of Malwa Regions were due to fly ash produced by thermal power plants located in Bathinda and Budha Nullah in Ludhiana. Some other reasons that were taken into consideration were pesticides and depleted uranium used in wars. But research says that there are no traces of uranium in soil as soil have been deposited upto several thousand metres of heights due to wearing and tearing of rocks and due to materials from rivers. Agrochemical processes are responsible for extracting uranium existing in the soils and result in uranium (Chemical) contamination of ground water. Irrigation water percolating through soil dissolves carbon dioxide gas produced at high pressures from the plant root respiration and the microbial oxidation of the agricultural matter. The resulting carbonic acid reacts with the insoluble calcium carbonate to produce soluble bicarbonate, which leaches uranium from soils and adds it to the ground water. Fertilizers are also considered to be one of the sources of contamination of Water through Uranium. A myth has been created that the diseases like autism, sub normal growth of special children and causes of cancer is due to high concentration of uranium in Malwa Region. Studies

were done in Finland where people drink water from well that has uranium concentration much higher than that compared to Malwa Regions. But there were no traces of cancer found in people there. So there is no direct link between uranium and cancer. This paper gives a review on: (1) Survey of quantity of uranium in groundwater at various locations in Malwa Regions from available literature. (2) Whether the cancer is linked to uranium found in groundwater or not.

P13: RAYLEIGH SCATTERING CROSS SECTIONS OF 59.54 KEV ENERGY PHOTONS IN ELEMENTS $1 \leq Z \leq 92$ (THEORETICAL APPROACH)

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Abstract: The elastic scattering of photons, being one of the fundamental modes of their interaction with matter, has been subject of substantial theoretical and experimental interest. The elastic scattering of low-energy (X-ray energy regime) photons by atoms is mainly contributed by scattering from the bound atomic electrons, i.e. Rayleigh scattering process. Rayleigh scattering cross sections are calculated for the incident photons of 59.54 keV energy in the elements ranging $1 \leq Z \leq 92$. The calculations are performed to explore the angular dependence to the Rayleigh scattering cross sections. The cross sections are calculated at ten scattering angles including forward and backward scattering angles. Main theoretical approach used for calculation is form factor formalism which was developed as correction factor to the well-known Thomson formula for scattering of a classical point electron charge by an extended charge distribution. The values for cross sections are calculated using modified form factor (MF). In the case of elastic scattering of photons with energy in the vicinity of the electron binding energy of the interacting atom, corrections are included to account for the effects related to atomic structure, such as virtual excitation and ionization of atomic electrons. These corrections to the modified form factors are commonly known as anomalous scattering factors (ASF's). The calculated values for Rayleigh scattering cross sections are compared to values obtained from another theoretical approach State of the art S-Matrix approach. Further the Rayleigh scattering cross section values are compared to experimental data available in literature.

P14: COMPARATIVE STUDY OF KOH AND TMAH ETCHING OF Si (100)

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Abstract: Miniaturization of device depends greatly on the way the device is fabricated. For this, etching plays a significant role. This paper reviews KOH and TMAH etching of Si (100).It highlights Si etching dependence on concentration and temperature for KOH and TMAH etchants. The effect of adding IPA in KOH and TMAH Si etching is also reviewed.

P16: MYSTERIES OF COSMOLOGY

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Abstract: The word cosmology refers to the study of physical universe, its structure, dynamics, origin and evolution, and fate. There are thousands of questions in our mind related to what we

observe in nature. Some of these questions are answerable and some are unanswerable and some answers come up with new questions. Physicists observe a phenomenon and try to explain them with the help of some laws, theories, and hypothesis. These theories are tested and are approved or rejected. It may take years to prove something. Lets see how the solutionsof mysteries are related to matter, antimatter, dark matter, and dark energy related to universe. We know anything which occupies space is called matter. We also know every particle has its antiparticle. But how matter and antimatter are related to origin of universe? Everyone knows universe is expanding, but no one knows why it is expanding. One such mystery is that why we are surrounded by universe made up of matter? Where is antimatter? The dark matterand dark energyare mysteries. But both were introduced to solvemysteries. Similarly there are thousands of such unsolved mysteries. We will see: what are these mysteries, how were these mysteries introduced, some of there possible answers, and why they are needed to be solved.

P17: QUARK-GLUON PLASMA

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Abstract: Quark-Gluon Plasma (QGP) is a state of matter in quantum chromodynamics which exists at extremely high temperature and/or density. This state is thought to consist of quarks and gluons, which are ordinarily confined inside atomic nuclei or other hadrons. This is an analogy with the conventional plasma, where nuclei and electrons, confined inside atoms by electrostatic forces at ambient conditions, can move freely. In normal matter, quarks are confined; in the QGP quarks are deconfined. A plasma is matter in which charges are screened due to the presence of mobile charges. The QGP can be created by heating matter up to a temperature 2×1012K which amounts to 175 MeV per particle. This can be accomplished by colliding two large nuclei at high energy. The study of QGP, which has both a high temperature and density, is part of the effort to consolidate the grand theory of particle physics. The study of QGP is also a testing ground for finite temperature field theory. The main theoretical tool to explore the theory of QGP is lattice gauge theory. It is believed that up to a few milliseconds after the Big Bang, known as the quark epoch, the Universe was in a Quark-Gluon Plasma state.

P18: IMPORTANCE OF ENERGY HARVESTING TECHNOLOGIES

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Abstract: Power generation technologies are extremely dependent on fossil fuels which are finite and highly responsible for global warming in addition to climate changes. Therefore, renewable energy technologies are good alternatives on large scale but on the other hand, there is a huge collection of small amounts of wasted energy in various forms like heat, sound, vibration or movement etc. If these small amounts of wasted energy can be renewed in to useful energy, it would be a significant achievement in the domain of energy harvesting. The term energy harvesting is a process that extracts valuable energy from wasted energy in numerous forms. There is a category of technologies as ‘Thermoelectricity’, ‘Piezoelectricity’, ‘Pyroelectricity’ which uses different types of state of the art materials like thermoelectric, piezoelectric, pyroelectric respectively based on their respective working principles for power generation.

P19: STELLAR EVOLUTION: FROM INTERSTELLAR CLOUDS TO BLACK HOLES

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Abstract: The life of stars begins with the gravitational collapse of massive interstellar clouds. This cloud collapse first forms a rotating protostar. When the temperature of the protostar reaches 15 million K, nuclear fusion of Hydrogen into Helium begins. At this time, the collapse is halted by the outward gas and radiation pressure due to this nuclear reaction. The star attains equilibrium and is said to be in main sequence phase. After spending 90% of the life in equilibrium, the core runs out of hydrogen and starts contracting. With further increase in temperature due to this collapse, heavier elements like Helium and carbon form. If the star is massive enough, it can even host a full scale Silicon fusion until the last product, Iron is formed. With no further exothermic reaction to keep the star alive, gravity gains the upper hand and a catastrophic collapse ensues forming a neutron star or a black hole, depending on the initial mass.

P20: GALACTIC NEBULAE

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Abstract: A Nebula is basically an interstellar cloud made up of about 90% hydrogen,10% helium and trace amounts of some heavier elements. Nebulae are spooky gas clouds which can both be vibrantly illuminated and sometimes completely dark too. They play a key role in evolution of our universe as they are the building blocks containing elements from which stars and planets are made. In my poster I'll be discussing the properties and formation of different types of nebulae including diffuse (irregular) and planetary (regular) nebulae and their further classifications. Moreover, people usually find difficulty in differentiating between galaxies and nebulae (earlier Andromeda was also thought to be a nebula), so In my poster, I'll also try to explain the fundamental differences between these two different structures generally confused to be same.

P21: EXPERIMENT TO MEASURE g ELECTRONICALLY

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Abstract: We have designed and built an experiment that measures acceleration due to gravity by measuring the time of fall for a body in free fall. The setup uses 3 or more light sensors arranged at different heights connected to an Arduino Uno. We find an interpolation or a regression parabola through the measured height and time data and calculate g using it. We also compared our analysis of the freely falling body by that of a motion tracking software. We have been able to get an average value of $9.79 ms^{-2}$, which is in agreement with other such experiments and theoretical estimates for Delhi. Similar experiments have been done using the same principles. Our goal was to make the experiment from scratch and make it cost effective while keeping appropriate accuracy for an undergraduate lab. We used generic photodiodes with lasers for light sensors. The designing process included solving various problems like accounting for the delays induced by electromagnet dropping mechanism, measuring response time of light sensors, scaling

up the experiment etc. Our analysis included taking 300 and more measurements for g and studying the distribution and the effect of lags on this distribution. We also varied the height of the setup from 2-3 metres in the lab to about 2 storeys along the staircase. At the present moment we have arranged the setup and are taking more measurements. We expect to complete our data analysis and documentation by next week.

P22: DIFFERENT METHODS OF DAY-LIGHTING AND THEIR COST-EFFECTIVENESS

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Abstract: The health benefits of the sunlight are well known. It not only gives a sense of refreshment but also helps in fighting Colon cancer, depression, sleep deprivation, and other general ailments. In fact the study has shown that working in sunlight instead of the artificial light can increase the productivity up to 16%. At the same time, the deficiency of sunlight may add to the risk of diabetes, tuberculosis, multiple-sclerosis and rickets. Hence, there is no surprise that the ancient Indian traditions and mythologies refer to the sun as 'Surya', who is capable of healing sick people. In addition to this, sunlight is also implied for beautifying the interior and for other architectural aspects. Spanning over the Temperate and Tropical zones, most parts of India receive an ample amount of sunlight round the year. However due to unplanned development and huge density of buildings and in urban and semi-urban areas, many houses and flats fail to take in considerable amount of sunlight round the year. Due to this, many a bed ridden patients and even small babies don't get the benefit of this crucial and free natural resource. Also, the use of sunlight at homes, schools and workplaces can not only increase the productivity but can also help reduce the carbon emission by artificial sources of light. This presentation represents various methods of day-lighting / light-pumping, comparing their efficiency and cost-effectiveness; and also suggests modifications to overcome some of the demerits of the present systems.

P23: KINGDOM OF 3D-PRINTING

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Abstract: 3 dimensional printing is a process for making 3-dimensional digital model, typically by laying down many successive thin layers of material that can be thermoplastic, metal and latex etc. During the recent years, we have seen that 3d-printing gained so much popularity and people believe on it because this technology has the potential to transform the world by simplifying manufacturing, shortening supply and distribution chains, democratizing production, creating and repatriating jobs, reducing waste, customizing products to our needs, and producing radically different products. This poster presentation is based on an additive manufacturing using Fused Filament Fabrication Technique (FFT). It Includes familiarization with Computer Numeric Control (CNC), Microcontroller (Arduino) programming, Filament Extrusion Technology, basic 3d-modelling of objects and complete assembling and testing of open source 3d printers. It also has idea about other techniques associated with 3d-printing which we use to built different 3d-products and after that it also includes the use of 3d-printer for human benefits like its application in space missions, automobile industry, real estate, medical industry and in online marketing purposes. Comments on dark side of 3d-printing, which leads to new kinds of crime like printing of guns or weapons, illegal drugs, counterfeiting of cash, branded products and illegal human organ business have been put here along with the ways to protect the world from intellectual

property rights violation and illegal 3d-printed products. Information about R&D labs or institutions which are working on large scale 3d-printing, to improve 3d-printers quality, processing and capacity to do more complex and big scale jobs and making it more accessible to mankind.

P24: ATOMIC CLOCK

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Abstract: For more than four decades, caesium atomic clocks have been the backbone in a variety of demanding applications in science and technology. The principle of operation of atomic clock is based on atomic physics. It uses the microwave signal that electrons in atoms emit when they change energy levels. These are the most accurate time and frequency standard till known. Major applications include implementation in satellite based navigation systems like US GPS (Global Positioning System), IRNSS (NAVIC) and also in telecommunication networks. An example of atomic clock is NIST-F1, one of the national primary time and frequency standards of the United States. We'll discuss briefly about the working, applications, future scope and improvements in the field of atomic clocks.

P25: CLOUD CHAMBER: REMOTE METHOD FOR PARTICLE DETECTION

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Abstract: Every second roughly 450 particles from outer space pass through our body, though harmless but unnoticed . 65 billion neutrinos pass through one centimetre squared of our skin every second -even while you are reading this. So many particles passing through everything if quite overwhelming and fascinating. These particles have high energy as result of their rapid motion. Cloud chamber is one of the earliest devices which detects these particles and visualised their passage in supersaturated vapour of alcohol. This project is an attempt to assemble a cloud chamber using basic laboratory items and analyse its results. We have also attempted to modify the construction , design and conditions of cloud chamber to check for various results and possibilities .

P26: DETECTION OF ALPHA PARTICLES USING SPARK COUNTER

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Abstract: An alpha particle, made up of two protons and two neutrons, are given out during radioactive decay. In order to detect these heavily charged particles, we may use an electrically operated device called spark counter. Spark counter is a visible way of showing and counting ionization of air caused by alpha particles. It is also a useful step towards understanding the Geiger Muller tube. In our experiment, an electric spark will be produced on the detection of alpha particles.

P28: COMPARING QUANTUM KEY DISTRIBUTION PROTOCOL WITH CURRENT CRYPTOGRAPHIC SCHEMES

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Abstract: The concept of quantum entanglement has given birth to many new branches of physics, the most interesting being Quantum Cryptography. Quantum cryptography applies the principles of Quantum Mechanics to protect information channels against eavesdroppers even when assuming that they have unlimited computing powers. The most well-developed protocol in quantum cryptography is Quantum Key Distribution (QKD) that establishes a shared private key between the sender (Alice) and the receiver (Bob). In this contribution, we illustrate richly the role played by quantum entanglement and quantum information in setting up a 'secure quantum channel' between Alice and Bob. Simple QKD protocols are analyzed and compared with the current cryptographic schemes being used in the industry like Public Key Distribution- Diffie Hellman, RSA, etc outlining the vulnerabilities of the latter. The future prospects of QKD are presented along with the practical challenges.

P29: TECHNOLOGIES IN QUNATUM REALM

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Abstract: Probing the matter to inner depths has been a natural intention of human nature. The more closer we approach, the more we come in vicinity of the reality. Recent decades have brought a tremendous amount of progresses in scientific methodologies on scales of interactions. Being excited with beauty of light based interaction phenomenon, here we present a review on current laser based advancements in order to receive information at smaller scales of dimensions. The work is having the details of various applications of quantum technologies starting from metallurgy, medical sciences to terahertz frequency regions etc.

P30: IDEAS LEDAING EVOLUTION IN QUANTUM PHOTONICS

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Abstract: Progresses in sciences have always shown their roots in light and its related phenomenon on scales of theory as well as experiments. Light is one of the tools, using which energy mechanisms happen. This beauty has been presented by the so far known fundamental forces in nature. Here we present a series of philosophical ideas responsible to bring an evolution in photonics based sciences and hence awarded with honours including Nobel Prizes. The work includes a review on light emitting diodes (LEDs), fibres for optical communication, charged coupled devices, holography and optical coherence etc.

P31: POSITRON EMISSION TOMOGRAPHY

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Abstract: Positron emission tomography is a nuclear medicine functioning technique which uses small amounts of radioactive materials called radiotracers, a special camera and a computer to help evaluate organs and tissue functions. It measures important body functions, such as blood flow, oxygen use, and sugar (glucose) metabolism, to help doctors evaluate how well organs and tissues are functioning. This radioactive material accumulates in the organ or area of your body being examined, where it gives off a small amount of energy in the form of gamma rays. Special cameras detect this energy, and with the help of a computer, create pictures offering details on both the structure and function of organs and tissues in your body. By identifying body changes at the cellular level, PET may detect the early onset of disease before it is evident on other imaging tests. Instrumentation has improved tremendously over the years. Spatial resolution has improved by a factor of 10 and sensitivity by a factor of 40 from the early designs in the 1970s to the high performance scanners of today. Multimodality configurations have emerged that combine PET with computed tomography (CT) and more recently with MRI. The combined PET/CT scans provide images that pinpoint the anatomic location of abnormal metabolic activity within the body. Whole body scans for clinical purposes can now be acquired in less than 10 minutes on a state-of-the-art PET/CT. This review thus discusses the scientific evidence that led to the emergence of PET imaging as an accepted tool in clinical research and healthcare applications, the history of technical developments over 40 years and the future clinical applications of imaging modality.

P32: NEW AGE POWER GENERATION THROUGH NUCLEAR BATTERIES

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Abstract: We are familiar with nuclear energy in nuclear power plants but not in nuclear batteries. Nuclear batteries are in fact closer to nuclear power plants than the traditional batteries in a way that they use radioactivity to generate power instead of storing an amount of charge. Nuclear batteries have been used successfully in space exploration for over four decades, powering twenty seven missions. The newest model, the Multi Mission Radioisotope Thermoelectric Generator (NMRTG),will power the future Mars 2020 rover. These nuclear batteries have been chosen for space applications time and again because despite their cost and the waste they generate, they are much long lasting and can survive in much harsher conditions than their chemical counterparts. Nuclear batteries are ideal for any application in which the device cannot be routinely maintained and serviced, or must withstand extreme environmental conditions. Many devices fall under this category, including those used in deep sea exploration, in implanted medical devices, and in front line military operations. Here we intend to explore the present state of nuclear battery technology and the recently discovered possible breakthroughs. We discuss the four successful nuclear battery designs ie. Radioactive Thermoelectric Generator (RTG), the Betavoltaic cells, Aqueous Nuclear Battery and The Diamond Nuclear Battery. Thus the success of this endeavour could allow for the realisation of a potential in nuclear batteries that has so far remained largely unexplored.

P33: NATURE WONDERFUL "AURORA"

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Abstract: An aurora is a natural light display in the sky particularly in the high altitude (Arctic and Antarctic) regions, caused by the collision of energetic charged particles with atoms in the high altitude atmosphere (thermosphere). The charged particles originate in the magnetosphere and solar wind and, on earth, are directed by earth's magnetic field into the atmosphere. These particles interact with the edges of the earth's magnetic field and when they collide with the gases in the ionosphere, the particles glow creating curtains of blue, green and magenta.The aurora borealis (northern lights) form when charged particles emitted from the sun during a solar flare penetrate the earth's magnetic shield and collide with atoms and molecules in atmosphere. These collisions result in countless bursts of light, called photons, which make up the aurora. Collisions with oxygen produce red and green auroras, while nitrogen produces the pink and purple colors. The collision excites the electrons of the gases to high energy states. When these drop back to ground states, energy gets emitted. This phenomenon is generally observed at northern and southern poles.

P34: Quantum Entanglement: Introduction and its Implications

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Abstract: Einstein had deterministic view that he didn't believe in the uncertain nature of the observables and held the view that if one knew of all the variables, affecting a system, to infinite accuracy, one should be able to predict the outcomes of observations to any accuracy desired. He gave a paper known as the EPR Paradox that lead to "quantum entanglement" and the concept of hidden variables. Quantum Entanglement is a quantum mechanical phenomena in which the quantum states of two or more objects have to be described with reference to each other, even though the individual objects may be spatially separated (i.e. they have simultaneous reality). The EPR paper limits discussion to binary mixed states whereas GHZ paper allows ternary mixing of states. GHZ paper demonstrates the contradiction between Hidden variable theory and Quantum Mechanics whereas the Bell's inequality only demonstrates contradictions of a statistical nature. This discussion will give an idea about Quantum Entanglement and an overview of Quantum Computers and Quantum Cryptography.