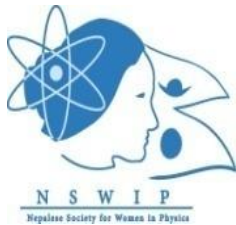


Second Regional Conference on Women in Physics, (RCWIP 2019) Nepal



Organized by



**Nepalese Society for Women in Physics (NSWIP) and Tribhuvan
University
Kathmandu, Nepal**

March 27-29, 2019

Venue: CV Raman Hall, Kathmandu University, Dhulikhel, Kavre

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Preface

It is our pleasure to announce that the Nepalese Society for Women in Physics (NSWIP) is organizing a three day international conference entitled “Second Regional Conference on Women in Physics (RCWIP-2019)” in association with Tribhuvan University, RECAST, the Ministry of Education, Science and Technology (MOEST), the Nepal Academy of Science and Technology (NAST) and the University Grants Commission (UGC) at Kathmandu University, Dhulikhel, Nepal from March 27 to March 29, 2019. The conference celebrates all types of investigations in physics and physics related materials, focusing particularly on women in physics and their incredible contributions.

The NSWIP is a non-profit professional organization, founded in May 2018 with the goal of encouraging professional development and nurturing future women leaders. We are committed to fostering sisterhood among women physicists of the country and to advocate for equal opportunity in girls’ education, research and professional development in science and technology. The NSWIP hopes participants who attend the conference will be inspired by the life-stories of established women physicists from all over the region. Participants will also be able to partake in discussions on the academic empowerment of women and put forward their own personal experiences. They can connect with experts in the field of physics, kick start new research ideas and learn about future career prospects.

Organizing such an international conference needs enormous technical, financial and logistic support. The organizing team would like to thank Tribhuvan University, International Union of Pure and Applied Physics (IUPAP), Working Group of Women in Physics (WGWIP) USA, the Abdus Salam International Centre for Theoretical Physics (ICTP) Italy, Research Center for Applied Science and Technology (RECAST), Ministry of Education, Science and Technology (MOEST), Nepal Academy of Science and Technology (NAST) and University Grants Commission (UGC), Nepal Physical Society (NPS), Heritage Publication & Distributors, United Academy, and Trinity College for their every kind of supports.

The NSWIP is grateful to professors for their acceptance to be the invited speakers for the RCWIP2019 conference. We greatly appreciate all the speakers and participants for their keen interest in attending this conference. We would like to sincerely acknowledge the enormous cooperation, logistical support and direction received from all the Advisory and Organizing Committee members.

Wishing you all the best for the grand success of RCWIP2019.

NSWIP
Organizer of RCWIP2019

Second Regional Conference for Women in Physics, Nepal (RCWIP), Program Details

DAY -1 (March 27,2019) Wednesday				
March 27, 2019		Inaugural Session		
8:30-09:30	Registration			
09:30 – 10:00	Guests to be seated			
10:00 – 11:00	Opening Session <i>-Honouring Guests</i> <ul style="list-style-type: none"> - <i>Inauguration of the Conference by Igniting the lamp by Chief Guest</i> - <i>National Anthem</i> - <i>Welcome Address</i> - <i>Keynote/ Plenary Lecture</i> - <i>InauguralAddress by the chief guest</i> - <i>End of Inauguration session</i> 			
11:00 – 11:30	Refreshments			
Session –I (Talks on Physics)				
11:30 – 12:00	Prof. Anisa Qamar	Magnetic Reconnection	Invited Talk	<u>Session Chair:</u> <i>Prof. Michael Steinitz (Canadian Journal of Physics, Canada)</i>
12:00 – 12:30	Prof. Farida Tahir	Neutrino Mass; Mystery, no more!	Invited Talk	
12:30-13:30	LUNCH BREAK			
Session –II (Talks on Women Education in Physics)				
13:30– 14:00	Prof. Shamima Choudhury	Gender Equality in Science and Engineering	Invited Talk	<u>Session Chair:</u> <i>Prof. Geeta Acharya (Tribhuvan University, Nepal)</i>
14:00-14:30	Prof. Dina Izadi	Linking the Art with Science by ORIGA – SCIE as STEAM Education	Invited Talk	
14:30 – 14:50	Dr. Gauri Shrestha	Women in Nepal: A Statistical Approach	Contributed Talk	
14:50-15:00	Tea Break			
15:00-17:00	Hiking/ Sightseeing Program, End of Day-1 of RCWIP			

DAY -2(March 28,2019) Thursday

Session – I (Talks on Physics)				
09:00 – 09:30	Prof. Setsuko Tajima	High Temperature Superconductivity and My Research Career	Invited Talk	Session Chair: <i>Prof Anisa Qamar</i> <i>(University of Peshawar, Pakistan)</i> Co-Chair: <i>Dr. Leela Pradhan Joshi</i> <i>(Tribhuvan University, Nepal)</i>
09:30– 10:00	Dr. Sethulakshmi Narayanan	Multifunctional Application Potentials of Manganite	Invited Talk	
10:00 – 10:30	Prof. Asghari Maqsood	Fabrication, Structural, Magnetic and Electrical Properties of (Co-Zn) Fe ₂ O ₄ Spinel Ferrite Nanoparticles	Invited Talk	
10:30-11:00	Prof. Tamanna Afroze	Dielectric Properties of Plasma Polymerized 2-(Diethylamino) Ethyl Methacrylate Thin Films	Invited Talk	
11:00-11:15	Refreshment			
11:15-11:35	Ms.Iffat Nur Esha	Study the Influence of Eu ³⁺ on the Magnetic, Dielectric and Resistive Properties of Ni _{0.4} Zn _{0.45} Cu _{0.15} Fe _(2-x) Eu _x O ₄ Ferrites Synthesized by Standard Solid State Reaction Method	Participant	Session Chair: <i>Prof. Deepak Subedi</i> <i>(Kathmandu University, Nepal)</i> Co-chair: <i>Dr. Sanju Shrestha</i> <i>(Tribhuvan University, Nepal)</i>
11:35-11:55	Ms.Armin Anwar	Enhanced ferroelectricity and ferromagnetism in Sm and Ti co-doped BiFeO ₃ nanoparticles compared to their bulk counterparts	Participant	
11:55-12:15	Dr. Leela Pradhan Joshi	Preparation of Mn Doped ZnO Films for Ethanol Vapor Detection	Speaker	
12:15-12:35	Ms. Usha Joshi	Estimation of Global Solar Radiation using Different Models at Mid Hill Regi Pokhara, Nepal	Research Scholar	
12:35-12:55	Mr. Prakash Man Shrestha	Impact of Linked Turbidity on Solar Radiation in Pokhara	Research Scholar	
12:55-13:55	LUNCH BREAK			
Session –II (Talks on Women Education in Physics)				
13:55– 14:25	Prof. Aziz Fatima Hasnain	The role of Physics Education in Women Development: A case in Pakistan	Invited Talk	Session Chair: <i>Prof. Shamima Choudhury</i> <i>(University of Dhaka, Bangladesh)</i>
14:25 – 14:55	Prof. Asghari Maqsood	Role of Women in Physics Teaching	Invited Talk	
14:55-15:15	Ms. Neeru Shrestha	Status of Women Physicists in Nepal	Research Scholar	
15:15-15:30	Tea Break/End of Day-2 Program			

DAY-3(March 29, 2019) Friday				
Session – I (Talks on Physics)				
09:00 -09:20	Mr. Devendra Raj Upadhyay	Investigation of physical properties of dust structure around NGC1514 Nebula in Infrared Astronomical Satellite Map	Research Scholar	Session Chair: <i>Prof. Raju Khanal (Tribhuvan University, Nepal)</i>
09:20-09:40	Ms. Anita Mishra	Estimation of Background Radiation in the Premises of Tribhuvan University, Kiritpur, Nepal by In-Situ Gamma-Ray Spectrometry	Research Scholar	
09:40- 10:00	Ms. Seema Karna	Time period for the precession of the Earth's aphelion in 3-D numerical	Participant	
10:00-10:30	Prof. Michael Steinitz	The Mechanics of Scientific Publishing, Peer Review, and Ethics in Publishing	Guest Speaker	Session Chair: <i>Prof. Kedar Lal Shrestha, (Tribhuvan University, Nepal)</i>
10:30-10:50	Dr. Sanju Shrestha	Resonant Tunnelling in Triple Well	Speaker	
10:50-11:20	Prof. Michael Steinitz	International year of Basic Sciences for development	Guest Speaker	
11:20-11:35	Refreshment- Parallel Session			
11:20-12:20- Poster Presentations and Evaluation				
Oral Presentations (By Participants) - Auditorium Hall				
11:35-11:50	Ms. Ambika Pandey	Study on the Influence of Direct Current Field on Dispersion of Activated Carbon		Session Chair: <i>Prof. Setsuko Tajima (Osaka University, Japan)</i>
11:50-12:05	Ms. Manisha Sharma	Daily, Monthly and Seasonal Variation on Geomagnetically Induced Current (GIC) From Mantasla Station		
12:05-12:20	Ms. Pratiksha Bhandari	Impact of super intense geomagnetic storms on field-aligned current and ring current		
12:20-13:20	LUNCH BREAK			
Session –II (Talks on Women Education in Physics) Skype Presenters				
13:20 -13:45	Prof. Adriana Predoi-Cross	Mentoring and Promoting Women in Physics	Contributed Talk	Session Chair: <i>Prof. Aziz Fatima Hasnain (Centre for Physics Education, Karachi)</i>
13:45- 14:10	Dr. Arundhati Dasgupta	Science is empowerment, but empowerment is not science: A critical look at gender and leadership in Physics	Contributed Talks	
14:10-14:50	Panel Discussion (4-6 members will be present)			

14:50-15:30

Award and Closing Ceremony (Vote of Thanks)/End of Program

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Invited Scientific Paper Abstracts

S1. What is Magnetic Reconnection?

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Magnetic reconnection is considered as a fundamental process in plasma that provides an underlying physics of different astro-events like solar flare, prominences, auroras, sunspots and galactic magnetotails, etc. The present talk reviews the current state of understanding of magnetic reconnection, especially in solar environment, as Sun is a major source of the events mentioned above. Recent developments in modelling of reconnection under the magneto-hydrodynamic framework will also be discussed. Since magnetic reconnection is a mechanism that facilitates the release of energy stored in magnetic field by permitting a change in the magnetic topology in different astro-events, hence some theoretical results regarding formation of sheets in two dimension and complex three dimension will be focused as well as the fundamental differences between reconnection in two and three dimensions will be identified. Further some evidences from observations and simulations of solar system plasmas that support this theory will be presented.

Keywords: Magnetic reconnection, magnetic fields, magnetic topology, solar plasma.

S2. Neutrino Mass; Mystery, No More!

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Unraveling the mystery behind the neutrino mass and the mechanism responsible for its generation are arguably the biggest goals in the communities of Particle Physics, Astroparticle and Cosmology. We achieve these goals, in this paper, through non-oscillation mechanism by “marrying” an absolute parallelism (AP) – geometry theorem (with spherically symmetric solution) with the Veneziano ghost theory of quantum chromodynamics (QCD). This, naturally, brings to the fore the unified physical mechanism that is responsible for the generation and ordering of neutrinos masses. Consequently, we predict the values of the individual masses of all the three types of neutrino and confirm that they are inherently saddled with the normal mass hierarchy (NMH) structure. Furthermore, we prove the remarkable consistency between our

theoretical approaches with experiments data, especially, the current Planck observational data that shows evidence for massive neutrinos from the Cosmic Microwave Background and Lensing Observations. Hence the object of our endeavors in this article is three-fold; firstly we successfully determine the masses of neutrinos, secondly we prove that neutrino mass hierarchy is normal mass hierarchy and thirdly we establish that neutrinos masses are gravitational in origin.

S3. High Temperature Superconductivity and My Research Career

Setsuko Tajima

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Since the high temperature superconductivity of the copper oxides was discovered in 1986, tremendous amounts of experimental and theoretical efforts have been devoted. Nevertheless, the superconductivity mechanism of these compounds has not been solved yet. I have been working on this subject for more than thirty years. Among many interesting results, I will focus in my talk on the anomalous phenomenon called precursory superconductivity at far above the critical temperature. This must be a smoking gun of the BCS-BEC crossover.

In addition, I will introduce my personal story about the research career. Because of the family reason, I was not allowed to go to the graduate school after finishing the undergraduate course. It must be unusual that a housewife becomes a university professor, but it really happened. I will explain what are the key points to return to academia after the career break.

S4. Multifunctional Application Potentials of Manganites

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Magnetoelectrics as well as multiferroics are one of the most interesting and challenging field of contemporary research as these materials possess immediate applications in the area of switching devices, sensors and spintronics. The most promising candidates are rare earth manganites, $A_{1-x}R_xMnO_3$; (A (rare earth elements) = La, Pr, Nd), (R (divalent ions) = Ca, Sr, Ba) and they exhibit properties such as Metal - Insulator transition and higher order magnetization. Rare earth $LaMnO_3$ is an antiferromagnetic insulator in the undoped state and the ferromagnetic properties are induced in them by means of double exchange mechanism. In the present work sodium (Na) is chosen since the ionic radius of sodium (116pm) is close to that of lanthanum (117.2pm) and hence the tolerance factor is unchanged by the substitution. Also the hole concentration in the material due to monovalent doping is high compared to the divalent doping. This influences the concentration of Mn^{3+} and Mn^{4+} ions, an important factor deciding the magnetic state of the system. This makes the magnetic, electrical and transport properties of these materials interesting. The influence of strain on magnetic property along with the ferroelectric characteristics makes Manganites far more interesting. Magnetic refrigeration, cooling

technology based on magnetocaloric effect (MCE) is a promising one over conventional thermomechanical cooling owing to its eco friendliness. MCE gives most effective, easily accessible, and highly economical cooling technology and the refrigeration mechanism is mainly attributed to magnetic materials which can have tunable magnetic characteristics as in manganites and where the coupling between the lattice and magnetic moments are stronger. Thus, manganites offer a plethora of application potentials in sensing, data storage, energy storage, magnetoresistance. An insight to the application potentials of manganese will be covered in the presentation in conference.

S5. Fabrication, Structural, Magnetic and Electrical Properties of (Co-Zn) Fe₂O₄ Spinel Ferrite Nanoparticles

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Nanotechnology is the understanding and control of matter at dimensions of approximately 1 to 100nm, where unique properties of the matter are expected. A ferrite is a type of ceramic material made of numerous oxides with one or more additional elements. The general formula for spinel ferrite is of the form MFe₂O₄, where M denotes a divalent metal ion, like Zn, Ni, Co, Li and Mn. According to the distribution of cations, there exist three spinel structures, namely: Normal, Inversed and Mixed. The fabrication of Co_(1-x)Zn_xFe₂O₄ with 0 >x< 0.6 by the co-precipitation method is reported along with the structural properties observed by the X-ray diffraction. The variation in the lattice constant, volume of the cell, x-ray density, average crystallite size and the specific surface area were obtained as a function of x. The Curie temperatures were measured with a laboratory made low field magnetic susceptibility apparatus in the temperature range 77-850K. It was observed that the Curie temperature decreased with the increase of Zn concentration. The Dc electrical resistivity measurements were carried by two-probe method from 370K to 550K. The material showed semiconductor like behavior. The activation energies and mobilities are obtained from these experiments. The dielectric constants as a function of frequency and composition were also investigated.

Keywords: Activation energy; Dielectric constant; Electrical resistivity; Ferrites; Nanoparticle

S6. MiDielectric Properties of Plasma Polymerized 2-(Diethylamino) Ethyl Methacrylate Thin Films

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Plasma polymerized 2- (diethyl amino)ethyl methacrylate (PPDEAEMA) thin films of different

thickness were prepared using a capacitively coupled glow discharge reactor. The ac electrical measurement of the Al/PPDEAEMA/Al thin films of different thickness were performed in the frequency region from 10^2 to 10^6 Hz and temperature region 298-398 K. Dielectric constant of PPDEAEMA thin films increases with increasing film thickness and decreases with increasing frequency which may be due to the complex nature of the deposition process of thin films in glow discharge. Dielectric constant decreases slightly as the temperature increases from 298 to 348 K and above this temperature the decrease is quite greater. The strong temperature dependence of dielectric constant at higher temperature is attributed to the thermally activated electron hopping mechanism. Dielectric loss increases with increasing frequency with loss peaks found at higher frequency which was shifted towards lower frequency as the thickness of the films increase. The AC electrical conductivity increases sharply as the frequency increases. Activation energy of PPDEAEMA thin films was found very low (about 0.02eV) which reveal that conduction may be dominated by hopping of carriers between the localized states at low temperature and thermally excited carriers in the high temperature region. AC conductivity reveal that Debye type mechanism is operative in the low frequency region and other mechanism is operative in the high frequency region. The characteristic dependence of dielectric constant on frequency could be explained by space charge accumulation at the structural interface of the PPDEAEMA thin films. Dielectric loss increases as the temperature increases.

S7. The Mechanics of Scientific Publishing, Peer Review, and Ethics in Publishing

Michael Steinitz

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This brief talk will be a condensed version of a short-course given at UNAM in Mexico City last year. I will discuss what your editor is looking for and what exactly it is that he or she does. This will, of course, deal with scientific content, but also with questions of attribution of textual material used and the avoidance of any possible implications of plagiarism or duplicate publication. It will be emphasized that communication is an essential part of the scientific endeavor. If you cannot communicate what you have done (verbally and in writing) then you haven't done it! Whether we like it or not, English has become the world-wide language of communication and a working knowledge is a great, if not essential, part of your preparation to be a working scientist. If you don't have it, a friend or colleague with good English skills is a very important asset. To write well requires not only language skill, but an understanding of how to write briefly and concisely in a manner that will inform and interest a reader who is not a specialist in your narrow sub-field.

S8. International Year of Basic Sciences for Development

Michael Steinitz

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I will summarize some of the past and future activities of Commission 13 of IUPAP. The work of the International Union for Pure and Applied Physics (IUPAP) is mainly devoted to the support of conferences such as the one we are attending today. Among its many commissions on subject areas of physics, Commission 13 is devoted to Physics for Development. For the next few years a large part of the work of Commission 13 will be devoted to the United Nations International Year of Basic Science for Development in 2022. Members of the commission are on the steering committee for the IYBSD. An important initiative for the next few years is to increase the availability of scientific instruments for both research and teaching in developing countries, and possibly collaborate with the non-profit Seeding Labs (seedinglabs.org) to facilitate donations such of equipment. Commission 13 is involved in the Lightsources for Africa, the Americas, Asia and Middle East Project (LAAAMP). Last year C13 Hosted a LAAAMP Midterm Workshop on 24 August 2018 at ICTP in Trieste, Italy. Collaboration with the American Physical Society's new Physics in Africa project is a promising new direction. Commission 13 members participated in the International Conference on Physics Education (ICPE2018), Johannesburg, South Africa, 1-5 October 2018. It has been decided that conferences sponsored by Commission 13 should devote resources to two areas: 1) support for affordable small instrumentation for teaching and research and 2) addressing the problem of plagiarism in scholarly publications, perhaps with an educational campaign made available to students in developing countries.

Contributed Scientific Paper Abstracts

S9. Preparation of Mn Doped ZnO Films for Ethanol Vapor Detection

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Mn doped ZnO thin films were deposited on glass-substrates using a spin coating using a mixture of Zinc Acetate salt with Manganous Chloride tetrahydrate in ethanol. The sample characterizations were done by using X-ray Diffraction (XRD), Scanning Electron Microscopy (SEM), Energy Dispersive X-ray (EDX) and ultraviolet visible spectrophotometer respectively. The XRD analysis showed intense crystalline peaks along (100), (102), and (101) planes. The average crystallite size of ZnO film was found to be decreased on Mn doping. The SEM images clearly revealed formation of granny like porous surfaces of ZnO film. The EDX experiment was performed for elemental analysis of above prepared Mn doped ZnO film. Optical results showed decrease in band gap of ZnO from 3.28 to 3.13 eV for increasing Mn doping percentage from 0 to 5%. Finally, the sensitivity measurements made with Mn doped ZnO film gas sensor in ethanol showed operating temperature of 160 °C which was about 20 °C lower than reported value.

Keywords: Surface Morphology, Optical Properties, Sensitivity, Operating Temperature

S10. Resonant Tunneling in Triple Well

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Triple well, made by AlGaAs and GaAs is interesting and important for low dimensional devices, as possibilities of tunneling and oscillating in it can be used to make oscillators, diodes etc. Schrödinger equations on well/barrier with appropriate boundary conditions are used. Their coefficients are related by using Transfer-Matrix (T-Matrix) method to study transmission coefficients. The observed peak of transmission coefficient at some energy values shows the

condition of resonant tunneling. Transmission coefficients are calculated by varying the well width keeping the barrier width constant and vice-versa. The effect of effective mass on the tunneling coefficients is also studied.

S11. Study of the Influence of Eu^{3+} on the Magnetic, Dielectric and Resistive Properties of $\text{Ni}_{0.4}\text{Zn}_{0.45}\text{Cu}_{0.15}\text{Fe}_{(2-x)}\text{Eu}_x\text{O}_4$ Ferrites synthesized by Standard Solid State Reaction Method

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A series of Eu doped $\text{Ni}_{0.4}\text{Zn}_{0.45}\text{Cu}_{0.15}\text{Fe}_{(2-x)}\text{Eu}_x\text{O}_4$ (NZCFEO) ferrites where $x = 0.00, 0.02, 0.04, 0.07, 0.10, 0.12, 0.15$ were prepared by Standard solidstate reaction method. The various characterizations were obtained using X-ray Diffractometer, Scanning Electron Microscope, Impedance Analyzer and Vibrating Sample Magnetometer. All the samples showed single phase cubic spinel structures with distorted lattice parameter. The substitution of Eu in place of Fe resulted in the increase of both X-ray and bulk density. The porosity decreases as a result of increasing Eu^{3+} concentration. The grain size shrinks till $x = 0.07$ and after that it enlarges for further substitution for Eu having major influence on magnetic and electrical characteristics. The dielectric constant of the system decreases. Moreover, AC and DC resistivity were observed to show an increasing trend with the increase of Eu^{3+} concentration and also activation energy increases. The increasing Eu content reduces permeability. However, significant change is noticed in the saturation magnetization and coercive field with the increasing Eu^{3+} content. Besides, noteworthy reduction of the Curie temperature results with the addition of Eu dopant.

Keywords: XRD; Microstructures; Permeability; AC resistivity; DC resistivity; Dielectric; Curie Temperature; M-H loop.

S12. Enhanced Ferroelectricity and Ferromagnetism in Sm and Ti Co-Doped BiFeO_3 Nanoparticles Compared to Their Bulk Counterparts

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Bismuth Ferrite multiferroic ceramics co-doped with Sm and Ti having the nominal compositions $\text{Bi}_{1-x}\text{Sm}_x\text{Fe}_{1-y}\text{Ti}_y\text{O}_3$ ($x, y=0.00, 0.03, 0.06$) were synthesized by conventional solid-

state reaction technique. Then using simple cost effective ultrasonication technique^[1] micrometer-sized powders grounded from these ceramic pellets were mixed with isopropanol to prepare nanoparticles. The structural, electrical and magnetic properties of these fabricated nanoparticles are compared with their corresponding bulk counterparts. X-ray diffraction patterns of 6% Sm-Ti co-substituted BiFeO₃ nanoparticles as well as their bulk powder materials confirmed a phase transition from distorted rhombohedral to orthorhombic symmetry. SEM and Dynamic Light Scattering (DLS) analysis revealed that Sm substitution at A-site and Ti substitution at B-site of BiFeO₃ with 6% concentration have improved particles surface morphology and reduced the average particle size in the range of 10-100 nm. These nanoparticles of this particular composition also demonstrate improved ferromagnetic behavior compared to their bulk counterparts^[2]. The fabricated Sm and Ti co-doped BFO bulk samples represent nearly paraelectric behavior (small remnant polarization) whereas their corresponding nanoparticles exhibit significantly improved ferroelectric polarization which is expected due to their suppressed leakage current density. The reduced dielectric constants of these nanoparticles compared to their bulk samples are associated with their improved morphologies and suppressed leakage current densities. The outcome of this investigation suggests that the enhanced structural and multiferroic properties of Sm-Ti co-doped BiFeO₃ nanoparticles are associated with homogeneous reduced grain size, significantly suppressed impurity phases and reduction in leakage current density.

Keywords: Multiferroics, DLS, Ultrasonication, Nanoparticles

S13. Estimation of Global Solar Radiation Using Different Models at Mid Hill Region Pokhara, Nepal

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The global solar radiation was measured by using CMP 6 pyrometer at mid hill Pokhara (Lat. 28.22°N, long. 83.32° E, Alt. 800m). The solar radiation mainly depends on sunshine hour, temperature, relative humidity, rainfall and others. In developing countries like Nepal, there is no more reliable authentic data of global solar radiation and measuring instruments due to the financial and technical constraints. To full-fill this needs, the empirical models are used to estimate global solar radiation using different metrological parameters and regression techniques. The finding regression coefficients can be used to predict the global solar radiation and compare this data to the measured solar radiation. Among the different models, quadratic equation of modified Angstrom model was the best to compare other models due to error analysis and their performance. After using the statistical tools RMSE, MBE, MPE & R² finally 0.27, 7.92, 2.90 & 0.69 are found respectively. Finally, it is concluded that the obtained empirical constants and

metrological parameters are utilized to predict the GSR at similar climatic region of Nepal.
Key words: Global solar radiation, meteorological parameters, pyranometer, empirical model, regression technique, error analysis

S14. Impact of Linke Turbidity on Solar Radiation in Pokhara

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Population growth, mechanization, and industrialization have now made humanity the equivalent of other natural processes in its effect on air-pollution levels and associated climatic change. Like turbidity is an important parameter for assessing the air pollution of Pokhara (Lat. 28.216°N, Long. 84°E and alt. 827 m). Because of the unavailability of spectral measurements, a model has been used to estimate the Linke turbidity factor (T_L) from broadband measurements of Global Solar Radiation on 2015. The average value of extinction coefficient (k) and Linke turbidity T_L are 0.32 ± 0.06 and 2.71 ± 0.47 respectively, which can be compared with other sites around the world. Relationship between turbidity coefficients and main metrological parameters have been further investigated.

Keywords: Air mass, Extinction coefficient, Clearness index, Linke turbidity, metrological parameter.

S15. Investigation of Physical Properties of Dust Structure Around NGC1514 Nebula in Infrared Astronomical Satellite Map

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In this research work, we have studied the physical properties of dust structure around the nebula in far infrared (100 μm and 60 μm) IRAS survey was performed using Sky View Observatory. An isolated dust structure (size: 1.99 pc \times 0.49 pc) at Galactic Longitude:165.53°, Galactic Latitude: -15.29° was found at the distance of about 185 pc. The dust color temperature is found to lie in the range 18.88 K to 33.35 K. A closet of about 14.5 K

suggests that our structure is not independently evolved or the role of discrete point sources in the field of nebula is important for the structure shaping process. The Gaussian temperature area is found to be 185.39 K and its center is 20.44 K. Also, the Gaussian mass area is found to be 120.95×10^{24} kg and its center is 5.018×10^{24} Kg. The flux in this region is found to vary from 3.74×10^{-8} MJy/sr to 9.66×10^{-8} MJy/sr. The total mass of the dust structure is found to be about $0.54 \times 10^{-3} M_\odot$. The Jeans mass is found to be greater than that of the total mass of the structure, suggesting no possibility of star formation activity.

Keywords: ISM; IRAS; Dust color temperature; Dust mass; Jeans mass estimation.

S16. Estimation of Background Radiation in the Premises of Tribhuvan University, Kirtipur, Nepal by In-Situ Gamma-Ray Spectrometry

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The ionizing radiation present in the environment is background radiation, which gives an idea about radioactivity present in that particular area. The background radiation in the premises of Tribhuvan University Campus at Kirtipur, Nepal has been estimated using a portable gamma ray spectrometer. The NaI(Tl) scintillation detector PGIS-2 (0.347 l) from Pico Envirotec Inc was used to conduct the in-situ measurements along the road within the Campus to measure radiation exposure level (dose rate) and source distribution. The survey area is selected as it contains agricultural fields, trees and open spaces in addition to buildings of various ages. It also has a small valley and hilly region spreading within the altitude of 1283.5 m to 1350.2 m. In addition to the natural radioactivity the fertilizers used for agriculture, building materials and radioactive sources in different Departments will contribute to the background radiation. Major sources of the background radiation were found to be ^{238}U , ^{232}Th and ^{40}K and the dose rate lies between 76.896 nSv/hr to 298.275 nSv/hr which is lower than the world average. Preliminary results of radiological distribution and mapping will be presented and this work is expected to provide idea for preparing complete radiological map of the country.

S17. Time Period for the Precession of the Earth's Aphelion in 3-D Numerical Model

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In 3-D numerical model, Earth moves around the Sun in an inclined plane of spherically symmetric system. The plane in which the Earth orbits the Sun is called the Earth's orbital plane, and crosses the ecliptic plane at two points, where the autumn equinox and vernal equinox occurs. During revolution period around the Sun, sometimes Earth moves above the ecliptic plane, sometimes on the ecliptic plane at the time of equinoxes, and sometimes below the ecliptic plane. Precession of Earth's aphelion is also known as apsidal precession because the apsidal precession moves eastward along the ecliptic relative to the fixed stars. Based on 3-D numerical model and using the degree of revolution (Φ_{se}) as variation parameters with the time, the time period for the precession of Earth's aphelion is derived.

S18. Study on the Influence of Direct Current Field on Dispersion of Activated Carbon

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Activated carbon (AC) is widely used material in different applications. Thin films of AC prepared with electrophoresis deposition can be utilized in different applications like gas sensor, super capacitor, electrode materials etc. Dispersion of AC plays an important role in the electrophoresis deposition of AC in conducting substrate. In this work dispersion of activated carbon (AC) has been studied with direct current (dc) electric field during sanitation. The AC was dispersed in water using Sodium Dodecyl Sulfate.

S19. Daily, Monthly and Seasonal Variation on Geomagnetically Induced Current (GIC) From Mantasla Station

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The variation of GIC is taken in the year for solar cycle 23 to study the diurnal, monthly as well as seasonal variation of Mantasla station. We have carried out work on "Variation of Horizontal Component of Magnetic Field in Low Solar Activity" to understand the variation of solar quiet (Sq) current and its effect on the Earth's surface. Geomagnetic storms are large disturbances in the earth magnetosphere and ionosphere that can perturb earth magnetic field and result in the flow of Geomagnetically Induced Current (GIC) through the transmission line, pipelines followed by the ground. We studied the variation of Sq current over the various 5 quietest days of different year ascending, descending and maximum phase of solar cycle. Results show that GIC exhibits transient variations with varying amplitude according to seasons and days of the different year. We found that magnitude of the GIC and the dB_h/dt is strongly related.

Keywords: Magnetosphere, Ionosphere, GIC, Solar quiet

S20. Impact of Super Intense Geomagnetic Storms on Field-Aligned Current and Ring Current

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The characteristics of field aligned current (FAC) and ring current are the key parameters to understand how solar wind energy is transferred from magnetosphere to the ionosphere. At high latitude, direct transfer of solar wind energy and momentum occur which is expected to influence the distribution and characteristics of FAC and ring current. This paper focused on the impact observed on FAC and ring current due to super intense geomagnetic storm. Strength of geomagnetic storms are assessed by Dst index. For this study, we have selected the super-intense storm having $Dst \leq -500$ nT occurred during solar cycle 23, which are very rare events. The cross correlation analysis used in this study suggests that the perturbation on the component of geomagnetic field during super intense storm are strongly correlate with the fluctuation pattern of FAC and ring current.

Keywords: Field-aligned current, ring current, cross correlation, Dst index, SYM-H index

S21. Photo Responsive Films Grown Through Laser Ablation of TiO₂-Ge Composite

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There has been an extensive research on Optoelectronic materials since few decades starting from the discovery of Si. Due to a heavy cost involved in the purification and fabrication of Si based devices, low cost semiconductors are now under consideration by researchers. Titanium dioxide- Germanium (TiO₂-Ge) composite thin films were prepared by Pulse Laser Deposition technique using third harmonic (355 nm) of Nd: YAG laser at fluence of 12.73 J/cm². Films were grown on n-type Si (100) substrate using TiO₂-Ge composite target. We in our research have used TiO-Ge based thin films as the potential materials to be used in optoelectronic applications. Single, di and tri-layer films on n-type polished Si substrate were studied for optoelectronic response. Tri-layer films deposited on polished Si substrate demonstrated a good I-V response in dark as compared to single and di-layer films. Trilayer film on polished Si substrate shows an improved I-V response in light also. Which can be attributed to quantum confinement effect (QCE) in Ge as observed through PL spectrum in visible region and UV/Vis absorption transition in visible region. Negative dielectric loss also shows the contribution of electrons from defects to the tri-layer film. . A detailed study of the various polymorphs of TiO₂ and presence of

Ge in crystalline form was carried out through Raman spectroscopy. Direct and indirect absorption transitions were observed through ultra violet and visible spectroscopy. Absorption edge shifted to visible region of electromagnetic spectrum is associated to a possible quantum confinement effect in Ge or strain generated due to lattice mismatch of Si substrate and Ge with TiO₂. This shifting of absorption transitions of thin film was also observed in photoluminescence emission in visible region.

S22. Lunar Eclipse Calculations in Tantrasangraha (C. 1500 CE)

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Simplicity of the calculational procedure is a characteristic feature of the Indian astronomical tradition. This is particularly true of the computation of the planetary longitudes and latitudes. Even with such simplified procedures, the computed values are reasonably accurate. For example, the computed value of the Moon's longitude in Tantrasangraha is correct unto a degree, on the average, even for modern dates. The physical variables associated with the lunar and solar eclipses (like the instant of conjunction or opposition, half durations of the totality etc) are very sensitive to the parameters associated with the Sun and the moon, and the particular procedure for computations. They are critically tested during eclipses. In fact, it was standard Indian practice to revise the parameters based on eclipse observations. Parallax plays no role in lunar eclipse calculation. Whereas it has a very significant effect on the occurrence of a solar eclipse and its progress. Correspondingly, the calculations are that much harder. In this presentation, we confine our attention to lunar eclipse computation in the celebrated text Tantrasangraha of NilakanthaSomayaji (c. 1500 CE). We discuss a simplified version of the calculations pertaining to lunar eclipse in Tantrasangraha, we outline the procedure for computing the middle of the eclipse, the half durations and half duration of totality using iterative processes. We compare the computed values based on Tantrasangraha with those obtained using modern procedure and tabulated in modern almanacs like the RashtriyaPanchanga. For some recent lunar eclipses there is very good agreement with the values computed using Tantrasangraha and the tabulated values. In some cases the agreement is excellent.

S23. Development of Cyclocopter Micro Air Vehicle

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The development of an efficient, maneuverable, and gust tolerant hovering concept with an expanded flight envelope is the key to the success of a micro air vehicle (MAV) in both military and civilian applications. This research investigates a new revolutionary concept of a cycloidal-

rotor-based vehicle (cyclocopter), which has the potential of achieving higher levels of aerodynamic efficiency and maneuverability compared to conventional rotary MAVs. The objectives of this research are: (1) design and build the first cyclocopter MAV to successfully achieve stable hover and (2) develop the control strategies to enable the first successful forward flight of a cyclocopter purely using thrust vectoring. The cyclocopter uses two cyclorotors and a third small conventional edge-wise rotor to counteract the torque produced by the cyclorotors spinning in the same direction. As part of this research, a series of flight capable twin-cyclocopters ranging from 100 grams to 550 grams were successfully developed. The forward flight control strategy for the twin-cyclocopter uses a unique combination of independent pitch phasing and rotational speed control of the cyclorotors. Unlike a conventional helicopter, a cyclocopter is propelled in forward flight purely by thrust vectoring. This allows the vehicle to maintain a level attitude in forward flight. Even though such a strategy could facilitate power-efficient forward flight, it is accompanied by a strong yaw-roll cross coupling, which is in addition to the inherent gyroscopic coupling that is present in hover. To understand these couplings and characterize the bare airframe dynamics, a 6-DOF flight dynamics model of the cyclocopter was extracted using time domain system identification technique. The model was able to validate the existence of the inherent roll-yaw coupling in forward flight, which was identified by contributions of roll-yaw coupling stability and control derivatives. The gyroscopic coupling is caused by unbalanced angular momentum and the controls coupling arises from increased propulsive forces at high phase angles. Decoupling methods involve simultaneously mixing roll and yaw inputs in the controller. After implementing the controls mixing strategy in the closed-loop feedback system, the cyclocopter successfully achieved steady, level forward flight up to 5 m/s.

S24. Superconducting Research Progress at Beijing University of Technology

1.

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During past years, the superconducting material has run to its eve of the large scale applications. In this talk, I will briefly introduce our group and present our recent progress and new results on both the coated conductors and MgB₂. The main points will be related to the following subjects: The Second generation of coated conductors, Textured NiW Alloy substrates, Development of buffer layers using solution derived method, Development of doped YBCO layer by TFA-MOD method, MgB₂ wires and tapes, and Preparation of nano-doped MgB₂ wires by combined CTFE and PIT techniques.

S25. Morphological, Optical and Sensing Properties of Graphene Decorated by Silver Nanoparticles and Pmma Thin Film Based Multifunctional Sensors

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Multifunctional sensors are extensively used to detect the humidity, gas, temperature and pressure in our surroundings for which we require a highly sensitive and efficient devices exhibiting quick response/recovery time. In this paper, we reported the change in electrical characteristics of graphene/silver nanoparticles composite (Gr-AgNps) and graphene/silver nanoparticles/PMMA composite (Gr-AgNps-PMMA) based efficient thin film sensors under different humidity, gas, temperature and pressure conditions. Aqueous solution of Gr-AgNps and Gr-AgNps-PMMA was drop casted over interdigitated copper electrodes with 50 μm gap embedded in the substrates in dust free environment. The surface morphology of the thin film was analysed using scanning electron microscopy (SEM). The value of band gap obtained from the UV-v is spectra for Gr-AgNps and Gr-AgNps-PMMA nanocomposites were 4.7 and 4.1 eV respectively that can be tuned possibly by varying the concentration of the constituents in the composite. Apparent increase in the capacitance (100-10,000 nF) with the increase in the humidity percentage (30-95 % RH) at different frequencies for both the sensors was recorded using LCR meter. Resistance of the sensors dropped to zero as the humidity level is increased from 30 to 95 % RH in the chamber. The devices were tested for real time stability and for fast response/recovery time. Both the devices showed an excellent stability and response by recording their resistance and capacitance respectively. A lagging of % RH decreasing response from % RH increasing response was observed at 500 Hz frequency for both the sensors depicted from the hysteresis curve. The humidity response of Gr-AgNps based sensors was observed comparatively better than that of the Gr-AgNps-PMMA based humidity sensors. Similarly, the change in the electrical properties of the devices with the subsequent increase in the gas (ammonia, ethanol and methanol) concentrations in the chamber was recorded at various frequencies. The sensitivity of the devices was greater towards ammonia as compared to ethanol and methanol due to high affinity towards ammine functional group. Finally, the temperature and pressure sensing features of the devices are obtained in this paper.

Keywords: Graphene, humidity sensors, thin film, response/recovery, band gap, hysteresis

S26. Fabrication of Aluminum Doped Zinc Sulfide Thin Films by Chemical Bath Deposition Technique using Non-toxic Complexing Agents

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Pure and Al-doped Zinc Sulphide (ZnS:Al) thin films have been prepared by chemical bath deposition (CBD) method on a glass substrate at 85°C temperature using non-toxic complexing agents. The molar concentration of zinc acetate was varied from 0.05M to 0.1M in order to optimize the growth of the ZnS thin films. Concentration of the Al were varied from 0 to 18 wt.% during preparation of ZnS:Al thin films. The effect of concentration of zinc acetate and doping concentration of Al on the structural, optical and electrical properties of the ZnS thin films was studied. The FESEM images of as-deposited film showed that the glass substrate was nicely covered by uniform spherical ZnS grains. The surface morphology was changed from uniform spherical ZnS grains to compact, large mosaic like structure with the increase of the molar concentration of zinc acetate. The grain size became large with the increase of Al concentration. Optical transmittance of ZnS and ZnS:Al thin films were studied by UV-visible spectroscopy. Transmittance was maximum of 85% in the visible to near infrared wavelength region for 6 wt.% of Al. The optical bandgap varied from 3.76 to 3.52 eV. Resistivity of the ZnS:Al thin films were decreased with the increase of Al concentration. Nanostructured ZnS:Al thin films with high transparency and low resistivity would be suitable for buffer layer in thin film solar cells.

S27. Comparative Study of Lead (Pb) and Chromium (Cr) Concentrations in Mining Sites in BirninGwari, Nigeria

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In this study, the contents, chemical partitioning and extent of pollution of heavy metals Pb and Cr were assayed and compared from 3 mining sites Bugai, Imagu and Rima of the soil of BirninGwari LGA, Kaduna State, Nigeria using atomic absorption spectrophotometry analysis (AAS). In partitioning, percentages of Pb distributions in soil samples were notably greater for non-residual fractions than residual fractions, suggesting Pb primarily derive d from anthropogenic inputs rather than geochemical background while Cr distributions were greater for residual fractions than non-residual fractions signifying Cr is of geochemical background inputs rather than anthropogenic. In all areas of study, Pb showed homogeneous distribution of Moderate Enrichment with a range of EF=2-5 while Cr ranged EF & lt;2 showing homogeneous distribution of Deficiency to Minimal Enrichment with the exception of IM4 (EF=2-5) having moderate enrichment. In all study areas Igeo order of contamination was Pb & gt;Cr.

Keywords: Concentration, speciation, atomic absorption spectrometer, heavy metal (Pb, Cr)

S28. Investigation of the Subsurface Condition Using Induced Polarization and Self Potential Method of an Industrial Waste Disposal Site of Chalawa, Kano, Nigeria

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Induced Polarization and Self Potential investigation was carried out around the industrial waste disposal site, Panshekara, Kano, in order to study the subsurface geologic structure with a view of determining the depth to the bedrock and thickness of the geologic layers. Vertical Electrical Sounding (VES) using Schlumberger electrode array configuration was carried out at five (5) VES stations using the ABEM Terrameter (SAS 1000) for data acquisition. The collected data was analyzed using computer software (IPI2WIN) which gives an automatic interpretation of the IP and SP, Surfer 7.0 Software and MS Excel. The result showed the rock topography of the site is underlain by five layers; Alluvium, laterite, weathered basement complex rocks, fractured basement complex rocks and fresh basement complex rocks. The chargeability value for alluvium is 0.01ms with thickness of 1.0m. The chargeability value for laterite range from 6.69ms to 24.8ms with thickness ranging from 1.2m to 2.5m. The weathered basement has chargeability values 43.0ms to 51.8ms and thickness of between 1.18m to 28.4m. The fractured basement has chargeability values ranging from 61.08ms to 66.9ms and thickness of between 1.10m to 64.24m. The fresh basement has chargeability values ranging from 76.5ms to infinity with thickness from 1km to infinity. The flow pattern is revealed from the SP analysis. The VES stations has SP values ranging from 5.87mV to 80.59mV. Areas with low IP and high SP values indicated regions of flow of contamination and these are located at VES station 1,3,4 and 5. Keywords :Induced Polarisation, Self Potential, Ves Stations, Thickness and Chargeability.

S29. Observation and Modeling of a Pseudostreamer in the Solar Coron

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Coronal mass ejections (CMEs) are the most violent eruptions in our Solar System. CMEs are responsible for large solar energetic particle events and severe geomagnetic storms that can harm astronauts, destroy satellites, and disrupt power grids on the surface of the Earth. In this study, we present a magnetic configuration of an erupting pseudostreamer observed on April 19, 2015 on the southern west limb embedding a prominence cavity. The eruption resulted into a relatively wide CME with round front and prominence core. In SOHO/LASCO C2 partial halo was observed. The prominence eruption begins with slow rise and then evolve to fast rise. We constructed the Non-Linear Force Free Field (NLFFF) model of this erupting pseudostreamer using the flux rope insertion method. The NLFFF model produces the three-dimensional coronal magnetic field constrained by observed coronal structures and photospheric magnetogram. From the simulation results, we determine process for the eruption by identifying where reconnection takes place and how much flux is reconnected. We will determine the pre-eruption twist and decay index and how they vary as the simulation progresses. In addition, we perform a topology analysis of the models in order to determine the location of quasi-separatrix layers (QSLs). QSLs are used as a proxy to determine where the strong electric current sheets can develop in the

corona and also provide important information about the connectivity in complicated magnetic field configuration.

S30. Solving the Puzzle of Dark Matter

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Dark matter constitutes 25% of the energy density of the universe and remains one of the greatest puzzles for humankind. At the center of this is a very light sub-eV mass particle called the axion -- one of the more compelling cold dark matter candidates. This talk will give an overview of the most sensitive axion experiment to date, the Axion Dark Matter eXperiment (ADMX) which has unmatched sensitivity to the Grand Unified Theory (GUT) axion. Recent ADMX results along with state-of-the-art quantum electronics and new techniques used to obtain these results will be discussed afterwards.

S31. Beyond the Standard Model – Searching for New Physics at CMS

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The first round of data-taking at the Large Hadron Collider (LHC) ended in 2012 on a high note with the Higgs boson (also called the God Particle) discovery. The second round of data taking with 13 TeV center of mass energy, provides an unprecedented opportunity to search for new physics effects in high energy particle collisions. In this talk, I'll cover the latest results from the Compact Muon Solenoid (CMS) experiment at the LHC on searches for new physics beyond the standard model of particle physics, including the Higgs sector.

S32. Indirect to Direct Bandgap Transition in Ge Thin Films on Si Substrate

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Germanium is an indirect bandgap semiconductor used for electronic devices. We prepared Germanium thin films using pulsed laser deposition to tailor its bandgap from indirect to direct nature. To convert the bandgap of these films from indirect to direct nature different parameters like surface roughness of the substrate (polished and unpolished) and target to substrate distance (5, 6, 7 and 8cm) are varied to optimize the structural, optical and electrical properties.

Films are deposited using the third harmonic (355nm) of Nd-YAG laser with spot size 8.87 μm ,

pulse energy 100 mJ and fluence 127.4 J/mm². Thin films with average crystallite size of 24nm were achieved using a short ablation time and lattice mismatched Silicon substrate. Thin films with average crystallite size of 24nm were achieved using a short ablation time and lattice mismatched Silicon substrate as depicted through XRD analysis. Direct transitions of 1.56 and 1.48eV are observed through uV-visible photo spectroscopy. Enhancement in bandgap from 0.74eV to 1.56eV and 1.48eV can be attributed to the quantum confinement effects due to small average crystallite size of 24nm (equivalent to the Bohr magnetron radius of Ge). Direct transitions and quantum confinement effect is also observed through photoluminescence. PL spectra shows two smaller peaks at energies 1.48eV and 1.56eV, while a broader peak with higher luminescence is observed in visible range. Dark and light IV characteristics shows a noticeable difference. Photo-responsive behavior and photo emission makes it a potential candidate for the photodetectors, photocells and light emitting devices.

S33. The High-Voltage Monolithic Active Pixel Sensor for the Mu3e Experiment

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The Mu3e experiment searches for the lepton flavor violating decay $\mu^+ \rightarrow e^+ e^- e^+$ with the goal of a branching fraction sensitivity of 10^{-16} . To measure the momentum and vertex position of low momentum electrons (10 - 53 MeV/c) originating from this rare decay with high precision, a tracking detector built from High-Voltage Monolithic Active Pixel Sensors (HV-MAPS) is implemented. The MUIPIX chip is a HV-MAPS and is produced in 180 nm HV-CMOS technology. HV-MAPS is the technology of choice because the chip can be thinned to 50 μm , is radiation-tolerant, has a high time resolution and is low cost. Furthermore, to reduce the material budget, the pixel electronics are embedded inside this sensor chip and the sensor chips are supported by a mechanical structure built from 25 μm Kapton foil.

S34. Comparison of Single Recording with Double Recordings of Dual Plane on-axis Digital Holography

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Digital Holography is an interferometric technique where the diffracted object beam interferes with the undiffracted reference beam. The interference pattern is recorded digitally and later the object information can be reconstructed by numerical method. The digital holography has the advantage of reconstructing the whole information that is phase and amplitude of object under study. On the basis of optical setup, there are two types of holography that is in-line and off-axis

digital holography. In in-line digital holography, the reference and object beam has zero angle with each other. It uses the whole bandwidth of CCD camera and has higher resolution but it suffers from the twin image which overlaps the object information and is only suitable for very small objects. The off-axis digital holography has an external reference beam which makes an angle with the object beam and on reconstruction the object information can be separated from its twin image. The off-axis holography needs a single recording but it does not use the whole bandwidth of CCD camera, therefore its resolution is low. Like off-axis digital holography, on-axis digital holography has also an external reference beam but it makes zero angle with the object beam, as a result it also suffers from twin image problem. There are many methods suggested in the literature to solve twin image problem, one of them is a dual plane on-axis method where two holograms are recorded on two slightly different planes and are later reconstructed by numerical method. The recording of holograms at two different planes is a time consuming process and a slight misalignment will introduce errors in the reconstruction. Therefore LCOS spatial light modulator is used for the displacement of object information at two planes to record the holograms digitally without manual adjustment of CCD camera. This manuscript proposes to compare the two methods of dual plane on-axis digital holography. The digital method of holograms recording via LCOS is compared with numerical method where a single hologram is recorded and later it is numerically propagated to another plane through a small distance and then both holograms are numerically processed to reconstruct the object information.

Poster Scientific Paper Abstracts

S35. Synthesis of Transparent and Hydrophobic Surface Layer on Glass

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Hydrophobic are those surfaces having the contact of angle greater than 90° . ZnO thin-films were prepared by using a simple method of Precipitation method which were prepared using the paste of ZnO of variable molarity (0.2M, 0.5M) with Zinc Acetate Dihydrate, Monoethanolamine, Distilled Water and 2-Methoxyethanol which were deposited on normal transparent glass substrate by Spray Pyrolysis Coating at 500° . The contact angle was measured by using goniometre(105°) which was then the surfaces were characterized by using scanning electron microscopy(SEM). It was found that the coated layer of ZnO on glass improves the hydrophobicity of the glass repelling the water droplets and rebound like elastic ball. There is going on wide range of research work on hydrophobic and superhydrophobic coating which brings the outstanding application of it in various fields. The research work emphasis the future work and development in respective field.

S36. Study of Dust Properties Around C-Rich AGB Star: IRAS 04427+4951

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We studied the dust properties of C-rich AGB star with IRAS name 04427+4951 located at R.A. (J2000) = $04^{\text{hr}} 46^{\text{m}} 33^{\text{s}}$ and Dec. (J2000) = $+49^\circ 56' 20.1''$. We chose this AGB star from the list of coordinates of AGB stars listed in SkyView Observatory. We also obtained the Flexible Image Transport System (FITS) image of this AGB star. We calculated the flux of ambient medium in the wavelength range $60 \mu\text{m}$ and $100 \mu\text{m}$. We plotted the contour plot of dust mass, dust color temperature and plank's function with the corresponding R.A. and DEC. We also calculated the mass whose average value was found to be $5.1 \times 10^{27} \text{ kg}$ and the dust color temperature of the corresponding C-rich star whose average value was found to be 23.4 K and the average value of the corresponding plank's function is found to be $8.1 \times 10^{-16} \text{ Wm}^{-2} \text{sr}^{-1} \text{Hz}^{-1}$. From the contour plots of mass and dust color temperature we found the inverse relation between them.

S37. Construction of LED Display for Displaying Textual and Graphical Information

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LED technology plays important role in electronic devices. Their use is ubiquitous. These devices display information about anything by forming a pattern of on and off LED at desired position. In this paper, we construct a circuit diagram for creating LED array in a grid pattern and program it using a microcontroller. Microcontroller has limited amount of Random Access Memory and consume less power. The pattern that will be displayed on the LED grid is stored in the RAM and converted into signals that will determine which of the LED on grid will be turned on. The consumption of power in the device can be reduced by applying signal to the row of LED grid one after another rapidly, creating illusion of full pattern display on that grid. The resulting device is tested for various pattern displayed on that array and use for scientific purpose.

S38. Optical Properties of Aerosols over Kathmandu Valley by Using Ground-Based Sun Photometer

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The optical properties of aerosols of Kathmandu valley for the year of 2013 are investigated by using aerosol data available on the AERONET website. The effect of climate parameters on aerosols is also investigated. The aerosol loading is found to be higher during hot and dry months such as March, April and May and lower during the rainy season July and August. Also, the turbidity of the air is found to increase with increase in wind speed but found to decrease with increase in precipitation. The study also shows that the average visibility of the air of Kathmandu is found to be about 23 km which becomes higher in summer season and lower in spring season. The visibility of air is found to decrease with increase in wind speed but found to increase with increase in precipitation. The size distribution of aerosols in Kathmandu valley is dominated by smaller size particles and it goes on increasing during summer season. Further, the precipitation is found to have positive impact on this size distribution while wind speed is found to have the

negative impact on it. Moreover, the air of Kathmandu valley contains abundance of fine mode aerosol particles when aerosols are divided into two size regimes fine mode and course mode.

S39. Occupational Radiation Exposure Among the staffs of Radiation Oncology Department in Bhaktapur Cancer Hospital, Nepal

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Radiation therapy has been used worldwide for the treatment of cancer. Radiation protection term has an imperative significance that refers to the technologies, perceptions, operations and requirements relevant to the protection of patients undergoing radiation diagnosis and therapy, medical staffs and general people against the detrimental effect of ionizing radiation. The main objective of this study is to maintain a pertinent standard of protection to the medical staffs of radiology department through the measurement and analysis of radiation exposure. For this, data of dose absorbed in 5 years from 2013-2017 has been studied which is measured through the thermo luminescent dosimeter (TLD) badges worn by the staffs on the collar of uniform or the laboratory coat. The absorbed dose is compared with the International Commission on Radiation Protection (ICRP) and ALARA principles to figure out the radiation risks and to formulate the protective measures if necessary to maintain the safe working environment.

S40. Relationship Between Luminosity and Wavelength for Different Temperatures

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The Second Kathmandu Astrophysics School, Organized by A/Prof. Michele Trenti, University of Melbourne, at Prithvi Narayan Campus, Pokhara, Nepal on 10-17, June, 2018. Academic lectures are complemented by supervised hands on group projects for optimal active learning and by science education/professional skill development seminar. Project work on the topic of luminosity and wavelength for different temperatures and compared the relationship. Luminosity is the relative quantity of radiation emitted by a celestial source, the total energy that a star produces in one second. It depends on both the radius of the star and on its surface temperature. Thus, the luminosity of a star ($\sigma T^4 4\pi R^2$) would increase if one increased either the size R or the surface temperature T. Learning progress on programming language with Python and Monte Carlo method in coding and problem solving. From that program, collected and improved the research and presentation skill by introducing to basic concepts and computational techniques in astrophysics and cosmology. Representation as well graphs were plotted on

luminosity and wavelength at temperature of WR 102 and made combined plot of Sun and Wolf-Rayet 102 with respect to their temperature. The main theme is to generalize the concepts for the value of luminosity can be calculated for other stars with the variation of wavelength for different temperatures.

S41. Correlation of Solar Magnetic Field with Different Parameters During Geomagnetic Disturbances

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During solar minima and descending phases of solar cycle, ICEMs and solar flares become less frequent and coronal holes become dominant structure leading to geomagnetic disturbances. These coronal holes are regions of formations of solar wind which gives rise to Co-rotating interaction regions and further High speed streamers. The main purpose of this study is to understand the variation in solar magnetic field and different parameters during geomagnetic disturbances. For the analysis we have used the data of ICEMS, HSS, CIR, Solar flare and used continuous wavelet analysis technique that observe the time frequency representation of a signal. We have also implemented discrete wavelet transform, by this technique we analyze the discontinuities and singularities associated with the events.

S42. Green Synthesis of ZnO Nano-Particles Using Ixora Coccinea Leaf Extract and Its Characterization for DSSC

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Nano-particles of Zinc Oxide (ZnO) semiconductor were synthesized from the mixture of zinc acetate or zinc nitrate salt with natural plant leaf extract of Ixora Coccinea using a simple and economic co-precipitation method. The preparation of zinc oxide nano-particles were confirmed by X-ray diffraction and Scanning Electron Microscopy (SEM) studies. The effect of Ixora coccinea in the synthesis of stable ZnO nano-particles was studied in this work. The optical properties: band gap and transmittance of synthesized ZnO were investigated using UV-visible spectrophotometer. The very stable zinc oxide nano-particles prepared with natural extracts such as Ixora coccinea and palm olein leaves are expected to have wide application of optoelectronic device fabrications such as dye sensitized solar cells, chemical and gas sensors, and many more other application of biotechnology.

S43. Investigation of Multi-Component Magnetized Plasma Interacts with the Carbon Surface

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Proper understanding of magnetized plasma wall-interaction is important in fusion devices and various other applications such as surface modifications, semiconductor processing, sputtering and etching. A multi-component plasma interacts with carbon surface in presence of an oblique magnetic field has been investigated using three fluids model. In the present case, the plasma is assumed to consist of two species of positive ions (95% H^+ and 5% He^+). The governing equations are solved numerically for given initial and boundary conditions. The results show that the obliqueness of magnetic field affects the plasma wall-transition mechanism. The slope of electrostatic sheath potential increases towards the wall and hence increases the velocity of ion species. It is found that the velocity of lighter ion species (H^+) is more influenced by the obliqueness of magnetic field than that of heavier ion species (He^+). Although ion and electron densities decrease towards the sheath region, the decreasing rate of electron density is much faster of ions. The peak of space charge density and the saturation point of net current density shift towards the sheath entrance. Furthermore, the reflection coefficient of hydrogen ions has higher value about 20% in magnitude than that of helium ions for the carbon surface.

Invited Country Paper Abstracts

C1. Gender Equality in Science and Engineering: Where Do We Stand?

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Recent advances in science and technology and a large number of scientists with a wide spectrum of skills, dedicated to new and innovative developments, have given a great hope for alleviation of hunger, poverty, malnutrition, unemployment and unhealthy living conditions of the teeming millions of the developing world. For this purpose, women—along with men—should be given ample opportunities to enter and excel in science, technology, and related professions. While women constitute half of humanity, even in countries where they have ready access to higher education, the number of women studying science, technology, engineering and mathematics (STEM) remains drastically below parity with that of men. Talented and capable women are essentially turned away from these fields, and the few who persist typically find themselves isolated and marginalized. As a result, the overall participation of women scientists and engineers in the workforce continues to be very limited, and these professional women seldom reach the top of the hierarchy—at universities, research organizations or policy making institutions in the government and private sectors.

Women's equality and empowerment is one of the 17 Sustainable Development Goals. All the SDGs depend on the achievement of Goal 5. STI plays a crucial role in meeting the SDGs. In fact Gender equality underpins all 17 of the Sustainable Development Goals and not just confined to SDG5 which explicitly targets discrimination, exploitation and violence directed at women and girls. So the SDGs that demand action on equitable distribution and access to science, technology and innovation (STI) are aimed not just at the world's poorest and least developed communities, but at women and girls everywhere.

In Asia, a higher proportion of women are found in science-oriented fields such as medicine, biology, and pharmacy compared to math-oriented ones such as physics, engineering and computer science, according to a study by UNESCO. Women are the most underrepresented not at the entry into science or math education as children, but in graduate studies, due to the “leaky pipe” of career development so that at every step up the ladder women presence becomes rarer. The world today faces a multitude of complex challenges – from climate change to global health epidemics to rising inequality – whose solutions are even more complex. The role of STEM education has never been more instrumental in a technology-driven world where some of the fastest-growing, lucrative occupations are in STEM fields. Women's contribution in every sphere is a must to build a developed nation, particularly in the science and technology sector. Women have started making their mark on the tech world in a big way. But it is going to take

continuous effort for women to keep moving forward in an ever-evolving digital world, which remains dominated by men.

Women are hugely underrepresented in the global technology workforce, not only in developing nations like Bangladesh, but also in developed countries like the United States of America and Great Britain. According to a recent statement by UN Secretary-General António Guterres, “women occupy less than 30 percent of research and development jobs” in science and tech worldwide, and few women can be seen in top positions. UNESCO data also show that around 30 percent of all female students in higher education opt for STEM subjects – science, technology, engineering or mathematics.

Men and Women must work hand in hand and must work hard. The status of women in science and education at the primary, secondary and higher levels in our country and ways and means of improving the methods of science education, status of women scientists in different sectors, their problems in career building in professional lives are prerequisites for improving the present situation. Despite many disadvantages, women in Bangladesh are showing their excellence in many of the professional lives as scientists, engineers and medical professionals. Lower representation of women in academic faculty and scientific leadership positions in these fields and especially in policy making bodies of the government is a reality even though highly unjustified. The drive and motivation of women in science is demonstrated by those women who persist in academic careers despite all obstacles.

C2. Linking The Art with Science by ORIGA – SCIE as STEAM Education

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How to engage students in the wonder of science and motivate them to learn science is a puzzle and researchers are trying to find the best models in education. Universities and high school-aged students often have conceptual difficulties in understanding and learning basic Sciences, so researchers’ attitudes in developing learning outcomes is the first critical step in education (Izadi et al., 2017; Blumberg P., 2014). Even to elementary schools, science should be more approachable so hands on activities as a form of active learning can help students to transfer science concepts into environments by imagination and illustration. Making models in several basic sciences projects can inspire them for expressing ideas on observed phenomena (Izadi D., 2017, 2015). AYIMI and ADIB institutes teach the fundamental of basic sciences by having students to share their concepts in two different age ranges. They have a lot of freedom to move in any direction of interest they would like. While this approach may seem more difficult logistically or pedagogically in our traditional system, a large fraction of students are prepared to study and are more engaged in learning when given the freedom to pursue their interests. We have found a place for Art in Science education and ORIGA-SCIE which is a combination of Origami with Science are used in our students’ contests.

C3. The Role of Physics Education in Women Development; A case in Pakistan

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The presentation provides a framework for the role of physics education in sustainable development in context with women development. It further suggests that numerous efforts are required for gender equity to install in a society like Pakistan. Physics contributes to the technological infrastructure and provides trained personnel needed to take advantage of scientific advances and discoveries. To promote physics education amongst the girls and ensure its role in the women development, we advocate that with the advancement of science and technology, there is a need to have equal participation of women in science and technology to achieve economic growth. In this presentation, we at the Centre for Physics Education made some mainstreaming gender-based studies in order to realize the status of women who are actively participating in science and technology. On the basis of our studies, we recommend that there is a need to increase the recruitment, retention and success of women in ST&I for achieving gender equity. From our investigations, we have found that many women and girls are excluded from participation in science and technology (S & T) activities by poverty and lack of education (at all levels), or by aspects of their legal, institutional, political and cultural environments. We have found that Women remain seriously under-represented in most disciplines of science and technology, and furthermore, are not well-represented in at the most senior levels in all disciplines. The job options for women remain limited to agriculture, services (domestic) and small-scale industries.

The framework also includes a discussion around the efforts of the Centre for Physics Education being undertaken to develop physics in a social context of Pakistan and their impact on the teaching and learning environment, especially as they relate to the development of women.

C4. Leading Women Physicists of Pakistan

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Pakistan is the world's sixth-most populous country with a population of over 212 million with 51% men and 49% women. In modern Pakistan, women have held high offices including that of the Prime Minister, speaker of the National Assembly, Leader of the opposition as well as federal ministers, judges and generals in the armed forces. When talking about the women physicists in Pakistan, it is noticed that almost 40% of the enrolled students in Physics are female at the universities. There are few only women universities catering the teaching of physics to undergraduates, Masters and Ph. D's. Many women have got the chance to work almost in all the organizations including research institutes, Atomic Energy Commission, Universities, Colleges and hospitals etc. Some of the hard-working and brilliant women have achieved the positions of

Chairs, Deans of various universities and Director Generals of certain organizations. But the number of these women is small compared to their male fellows, especially writing the number of publications, production of Ph. D students and winning of Projects. This document gives a critical study of the productive women physicists of Pakistan (less than 20%). The number of fellows of Pakistan Academy of Sciences (less than 5%) the civil awards won by the women Pakistani Physicists. Suggestions for improving the contributions of Pakistani female Physicists are also undertaken. Pakistan Council for Science and Technology and Pakistan Higher Education Commission are playing important role to encourage females to take up research in Physics.

Keywords: Women Physicist; Research institutes; Atomic Energy Commission, Pakistan Academy of Sciences

Contributed Country Paper Abstracts

C5. Women in Nepal: A statistical approach

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Women represent almost half of the total population in Nepal. No development effort can be meaningful without proper integration of men and women. Women's issues are not of the greater importance to Nepalese government till 1980's. Women as a development concern was only included for the first time in sixth five year plan (1980-1985). This paper deals with the conceptual outline of status of women with reference to socio-economic and demographic perspective. It also exposes gender base difference in education, health, nuptiality, fertility, household headed, occupation and economic status. For this purpose a number of available indicators of women issues are reviewed. The data for this study has been taken from the Population census and Demographic Health Surveys. The relevant data has been presented and analyzed on the basis of the gender base and over time.

Keywords: Socio-economic, demographic, nuptiality, indicators.

C6. Status of Women Physicists in Nepal

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In Nepal number of women in physics is low, and it is in global context too. Because it is considered as a difficult subject and time consuming science that demands best brains. The education system in Nepal provides equal opportunities for men and women to study science including physics. Recently, four-year undergraduate science program with physics major in the fourth year has started in Nepal since 2012 for enhancing physics education. From 2002 through mid-2018, the number of female students elevated gradually at undergraduate, postgraduate and PhD levels due to various opportunities including abroad study and research work in different fields of physics. We hope for further significant improvement in physics education among females so that the trend continues leading to the increment of women physicists in Nepal.

C7. What Can We Do to Encourage and Keep Women in Science? A perspective from the United States of America

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In this talk I will elaborate on current efforts in bridging the gender gap in the fields of Science, Technology, Engineering and Math (STEM) in the United States of America. Our last president, Barack Obama, a father of two girls, has often voiced a need for increasing the participation of women in science. “One of the things that I really strongly believe in is that we need to have more girls interested in math, science, and engineering. We’ve got half the population that is way underrepresented in those fields and that means that we’ve got a whole bunch of talent ... that is not being encouraged...” President Barack Obama February 2013¹

In 2017, the Office of the Chief Economist (OCE) released two reports updating and expanding on the work examining the science, technology, engineering, and math (STEM) workforce. The second of these reports² provides a more detailed look at the gender dynamics of the STEM economy. Key findings in this report are the following.

- Women filled 47 percent of all U.S. jobs in 2015 but held only 24 percent of STEM jobs. Likewise, women constitute slightly more than half of college educated workers but make up only 25 percent of college educated STEM workers.
- The gender wage gap exists in STEM jobs; however, the gap is smaller in STEM jobs than in non-STEM jobs.
- While nearly as many women hold undergraduate degrees as men overall, they make up only about 30 percent of all STEM degree holders.
- Women with STEM degrees are less likely than their male counterparts to work in a STEM occupation; they are more likely to work in education or healthcare.

To bridge this gap and engage and support women in science, United States has adopted multifaceted approach: narrowing the gaps very early in education by increasing young girls' participation in math and science courses; reducing the dropout rate of women in STEM careers; incentives with relatively greater earning potential of women in STEM careers; better conditions for women in the workforce; highlighting strong role models and putting in place an active and extensive network of mentors. This effort was brought to the international stage through the launch of the Equal Futures Partnership program in 2012. Many other countries might not have as much financial resources to invest in this endeavor but there are

- 1 https://www.whitehouse.gov/sites/default/files/microsites/ostpstem_factsheet_2013_072320_13.pdf
- 2 <http://www.esa.doc.gov/reports/women-stem-2017-update> many aspects of these programs that can be implemented at different levels and will be focus of this presentation.

C8. Promoting Women in Science

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All around the world until today, women's participation in traditionally male-dominated disciplines like Science, Technology, Engineering, and Math (STEM) fields has been less than satisfactory. Recently, various educational institutions, scientific bodies, and governments have made efforts to understand this issue through social science research and have also implemented targeted projects in order to foster inclusion of women in science. This talk will focus on another side of this issue that tends to be less discussed: what can young women scientists do to overcome gender-specific hurdles in STEM fields and establish themselves as successful scientists? How does one challenge the status-quo that marginalizes women in STEM? The hope is that women would be left with some strategies to deal with this issue that have worked for successful women from STEM fields in the past.

Poster Country Paper Abstract

C9. Status of Women in Physics Education in Different Province of Nepal

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Nepal is a developing country and with the new constitution promulgated in 20 September, 2015 federalism was introduced in Nepal. The seven Province was introduced replacing the earlier system of fourteen Zones and five Development Regions and Province was formed by assembling existing Districts. We report the development and student's enrollment in Masters and PhD programs of physics in different Province of Nepal. The result of the survey mainly focuses on the participation of women in physics at different Province of Nepal. This study shows that among the seven Province of Nepal, only four of them have the Masters in Physics program and only one Province have PhD program. We also present the status of female permanent teaching faculty members in physics in Masters in Physics programs at different Province from the survey done at the end of 2018.

Webinar Abstracts

W1. Mentoring and Promoting Women in Physics: Lessons and Good Practices from Other Countries

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This talk will discuss the importance of mentoring at different career stages of women in physics. Effective mentors can help their mentees to grow professionally and become not only good academics but also have confidence, good communication skills, time and project management skills, and a deep network of collaborators. Such individuals will be well suited for the 21st century job market, with proven better job retention rates, strong ethics and a culture of excellence. I will present examples of how mentoring could be implemented at university level, complemented by advice from successful women in science.

W2. Science is Empowerment but Empowerment is Not Science: A critical look at gender and leadership in Physics

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Why there are no female Newtons or Einsteins has been debated previously. In this talk we examine the role of leadership in science, and if gendered leadership can change the future of physics. We ask the question if introducing the feminine can pave the way for more discoveries, and unearth newer ways of interpreting nature; independent of gender of the discoverer.

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on
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