

Newsletter



Syed Babar Ali School of Science and Engineering

09 | Jan-Mar 2019



19TH ADVISORY BOARD MEETING

ABDUS SALAM MEMORIAL LECTURE

SBASSE WEBCAST

GALLIENO DENARDO AWARD

QUANTUM & NANO-PHOTONICS LAB

CONTENTS

19TH ADVISORY BOARD MEETING OF SBASSE | 03

ABDUS SALAM MEMORIAL LECTURE ON THE PECULIAR STORY OF CHIRALITY | 04

SBASSE ORGANISES GRADUATE PROGRAMMES WEBCAST | 05

QS WORLD UNIVERSITY RANKINGS 2019 | 06

MAJOR DAY 2019 IN ISLAMABAD | 06

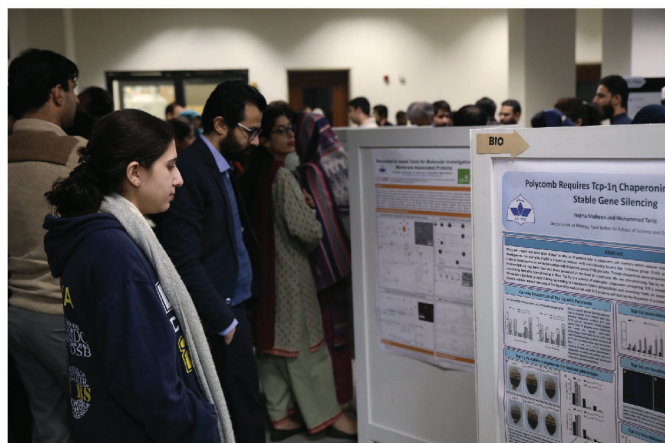
ACHIEVEMENTS | 07-08

WORKSHOPS | 09-10

DISCOVERY | 11-12

COMMUNITY | 13-14

QUANTUM & NANO-PHOTONICS LAB | 15



19TH ADVISORY BOARD MEETING OF SBASSE

Syed Babar Ali School of Science and Engineering (SBASSE) organised its 19th Advisory Board Meeting from January 29 – February 1, 2019, with the aim to discuss strategic planning for the next ten years.

Dr. Khurram Afridi (Cornell University, USA). Prof. James Wescoat led the session, 'Planning for the next ten years'. Later on, the convener of the committee, Dr. Basit Yameen, presented the first report of the strategic planning committee.



GROUP PHOTO OF SBASSE ADVISORY BOARD MEMBERS

Vice Chancellor, LUMS, Dr. Arshad Ahmad, opened the event and shared an update on the latest developments at the University. Prof. Shahid Masud, Dean SBASSE, presented the School's updates as a response to the last year's Advisory Board Report. The Department Chairs of SBASSE shared the vision, status and strategy of the departments, their research and achievements of their respective faculty members and students.

The Advisory Board members included, Prof. James Lallou Wescoat JR (Chairperson Advisory Board SBASSE and MIT, USA), Prof. Sally Merrick Benson (Stanford University, USA), Prof. Khalid Aziz (Stanford University, USA), Prof. Muhammad Hamid Zaman (Boston University, USA), Prof. Michael Gerard Pecht (University of Maryland, USA), Dr. Hassan Masud Ahmed (CEO and Chairman, Sonus Networks, USA), Dr. Dara Entekhabi (MIT, USA), Dr. Khaled Letaief (Hong Kong University of Science and Technology, China), Dr. Sarfraz Khurshid (University of Texas, USA) and

The Department Chair of the Chemistry and Chemical Engineering, Dr. Basit Yameen and the Dean, Prof. Shahid Masud respectively, shared updates on the Chemical and Civil Engineering Programmes.

Dr. Muhammad Abubakr, Director, Centre for Water Informatics and Technology gave an update on the Centre's activities and its future direction. Likewise, Dr. Naveed Arshad, Associate Professor, Department of Computer Science presented the vision, status, funding resources and future strategy of the new Centre of Energy. Additionally, Associate Professor and Chair, Department of Biology, Dr. Aziz Mithani presented the updates on last year's workshop on Infectious Diseases to the Advisory Board.

The Advisory Board Members also met with the Deans of each School as well as with the faculty, students and staff to get a sense of the opportunities and challenges being faced by the Schools.



AB MEMBERS SESSION WITH THE STUDENTS

Prof. David B. Kaplan delivered the Salam Memorial Lecture on “The Peculiar Story of Chirality”. PhD and MS students of SBASSE presented posters of their ongoing research in the areas of Biology, Computer Science, Chemistry and Chemical Engineering, Mathematics, Electrical Engineering and Physics.

The entire event was highly productive, for both the School and the members, and the discussions helped in understanding directions for the next ten years of the School.

ABDUS SALAM MEMORIAL LECTURE ON THE PECULIAR STORY OF CHIRALITY

Fifth Abdus Salam Memorial Lecture was organised on the topic of ‘The Peculiar Story of Chirality’ by Prof. David B. Kaplan. Prof. Kaplan described the understanding of fermion chirality, just as light can be left- or right-circularly polarised, fermions too can be ascribed a handedness, or “chirality”. The lecture was held on January 30, 2019.

David Kaplan received his PhD from Harvard University in 1985, under the supervision of Howard Georgi, with a thesis on how the Higgs boson could be composite. Following a post-doc at Harvard, Professor Kaplan took a faculty job at the University of California in San Diego, then in 1994 moved to the Institute for Nuclear Theory at the University of Washington in Seattle, where he currently resides. His research has touched on aspects of physics beyond the Weinberg-Salam model, lattice quantum field theory, particle cosmology, and low energy nuclear physics. Currently he is working on aspects of entanglement and quantum computing. Professor Kaplan

is a member of the American Academy of Arts and Sciences, and the US National Academy of Sciences.



SYED BABAR ALI AND PROF. KAPLAN AFTER THE LECTURE

SBASSE ORGANISES GRADUATE PROGRAMMES WEBCAST

Syed Babar Ali School of Science and Engineering (SBASSE) organised a Graduate Programmes Webcast 2019 to engage faculty, students and alumni from across the world, on March 01, 2019. During this online session, key information was shared on the SBASSE MS and PhD programmes offered in six disciplines: Biology, Chemistry, Computer Science, Electrical Engineering, Mathematics and Physics, which impart top-quality education with a vision to carry-out world-class, multidisciplinary education and research.

The SBASSE panel included the Dean, Prof. Shahid Masud, Department Chairs, current MS students and alumni. The webcast was moderated by Dr. Basit Shafique, Assistant Professor Computer Science and convener of graduate programmes. The panel was broadcast online for a high-powered, one-and-a-half-hour session to take students through the best educational experience in the region.



COMPUTER SCIENCE DEPARTMENT COLLABORATES WITH NESTLE TO IMPROVE LAHORE ZOO EXPERIENCE FOR VISITORS

Lahore Zoo, Nestle and LUMS have entered into a contract, based on which Nestle will support the complete overhauling of the Lahore Zoo. At the centre of this transformative change is the official 'Lahore Zoo Mobile App' developed by the Computer Human Interaction and Social Experience Lab (CHISEL) at SBASSE. This project was led by Dr. Suleman Shahid, Assistant Professor in the Department of Computer Science. Purpose of the project is to transform the zoo into a "digital

learning space."

The Lahore Zoo App will contain a map of the zoo, interactive games for children and a reader for QR codes on the information boards, which will provide extensive information on the animals housed at the zoo.

QS WORLD UNIVERSITY RANKINGS 2019

QS World University Rankings 2019 have been released and SBASSE Subject ranking has improved from the last year.



Among the six disciplines, three have been ranked this year 2019. Computer Science ranking has improved from the last year and Physics has

been ranked for the first time.

Congratulating the LUMS community, Dr. Arshad Ahmad, Vice Chancellor, LUMS said, "What distinguishes LUMS from other top institutions is an increased focus on research, academic rigour and a close connection with community based on trust and respect. The success in these areas will only grow as these rankings look at inputs that have become richer and more sophisticated. LUMS is attracting the recognition it deserves internationally in light of several other noteworthy accomplishments the University has attained this year."



MAJOR DAY 2019 IN ISLAMABAD

Syed Babar Ali School of Science & Engineering (SBASSE) conducted a Major Day event in Islamabad on March 17, 2019. The event comprised of an informed overview of the SBASSE curriculum by the Dean, followed by an extended Q&A session in which parents had their queries and concerns addressed.

The audience really appreciated the idea and showed keen interest in participating in all such activities conducted by the school in the future. A feedback survey was also conducted through which, the school got important insight about various parameters i.e. quality of instruction, academic workload, accessibility of SBASSE facilities, etc.



DR. MUHAMMAD FARYAD WON THE 2019 ICO/ICTP GALLIENO DENARDO AWARD

The international commission for Optics (ICO) and the Abdus Salam International Centre for Theoretical Physics (ICTP) has declared Dr. Muhammad Faryad, Assistant Professor in the Department of Physics, as winner of the 2019 Gallieno Denardo Award, for his contributions to Optics research and education.

The Award recognises the contribution of young physicists under the age of 40 years who are working in a developing country. Dr. Faryad's award citation reads, 'For his contributions to the understanding of light interaction with nanostructured materials, and applications in the area of optical surface waves, solar cells, optical metamaterials and the modelling of wave propagation in the



nanostructured mediums.' Dr. Faryad was nominated for the award by Dr. Muhammad Sabieh Anwar, current faculty and former Chair of the Physics Department, SBASSE.

CHEMISTRY UNDERGRADS RECEIVE FULLY-FUNDED PHD ADMISSION OFFERS FROM TOP-TIER US UNIVERSITIES

Keeping the department's tradition alive, BS Chemistry undergraduate students have received multiple admission offers from prestigious universities in the USA. These include the University of Illinois Urbana-Champaign (UIUC), University of Minnesota, Texas A&M University, Ohio State University, University of Massachusetts Amherst, University of Florida, Michigan State University, Rensselaer Polytechnic Institute and Indiana University Bloomington.

Department of Chemistry and Chemical Engineering is committed to transforming into a regional leader in Chemical Sciences and Engineering

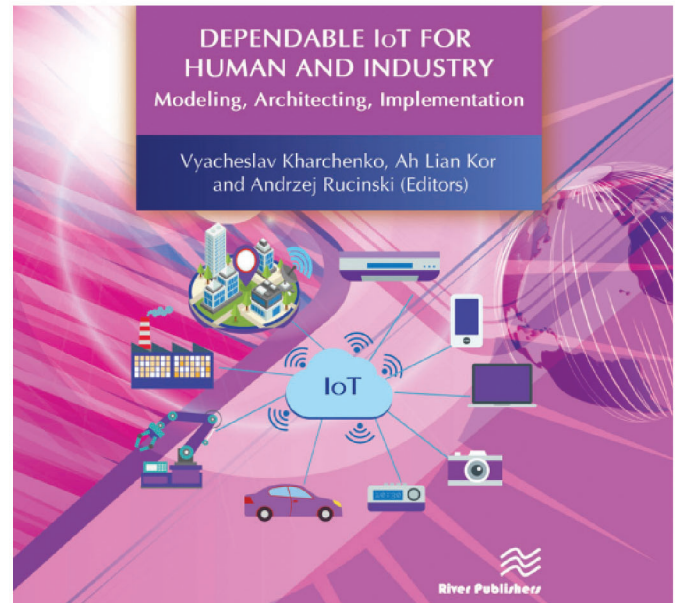
through excellence in teaching, research and academia-industry partnerships. Over 80% of the BS Chemistry and Chemical Engineering programme graduates aspire to pursue higher education from top-tier graduate schools in the US and so far the success rate of their placement is 100%.



EE FACULTY AND STUDENT PUBLISH A BOOK CHAPTER ON THE THEME OF DEPENDABLE IOT FOR HUMAN AND INDUSTRY

EE Faculty and Student in collaboration with Hochschule Offenburg, Germany, published a book chapter on the theme of Dependable Internet-of-Things (IoT) for Human and Industry.

The work resulted from a DAAD-funded project carried out at LUMS during 2017-18 overlapping with MS thesis of Mr. Awais Ahmad (MS-EE 2015 Batch) under the supervision of Dr. Adeel Pasha. The title of the thesis and book chapter is "Design and Simulation of an Energy-Efficient Sensor Network Routing Protocol for Large-Scale Distributed Environmental Monitoring Systems". Dr. Adeel Pasha, Prof. Shahid Masud and Prof. Axel Sikora (Hochschule Offenburg, Germany), also contributed as co-authors in this book chapter.



EE FACULTY PRESENTS RESEARCH WORK AT THE PRESTIGIOUS 22ND IEEE CONFERENCE ON DESIGN, AUTOMATION AND TEST IN EUROPE

Dr. Adeel Pasha, Assistant Professor in the department of Electrical Engineering, presented a paper "Towards Design Space Exploration and Optimization of Fast Algorithms for Convolutional Neural Networks (CNNs) on FPGAs" at the 22nd Annual IEEE Conference on Design, Automation and Test. (DATE'2019) held in Florence, Italy, from March 25 to 29, 2019. Mr. Afzal Ahmad (BSEE-2017 Alumnus) who is currently working as a Research Assistant (RA) with Dr. Pasha is the first author in this paper.

The paper also won the HEC International Travel Grant as well as the LUMS Faculty Travel Grant (FTG).

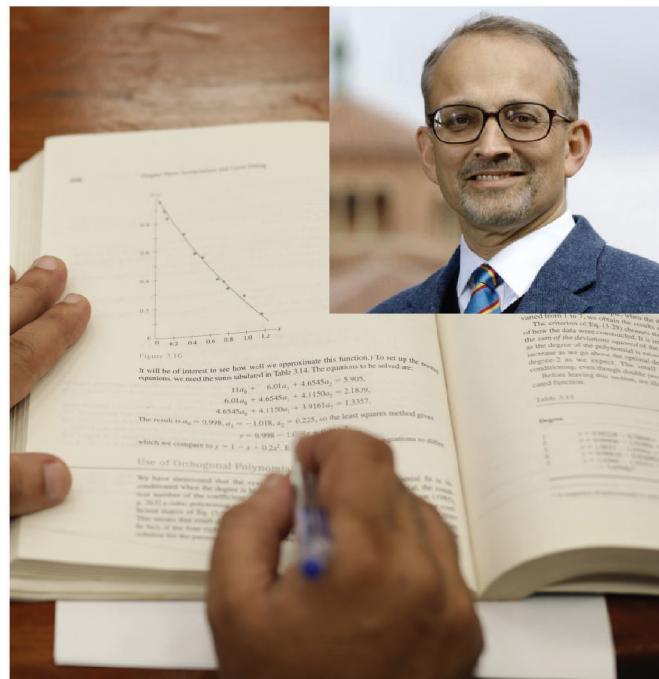


WORKSHOP ON MECHANICS FOR PHYSICS TEACHERS

Teachers play a very important role in building societies and grooming students to be future leaders. Training teachers of all subjects and schools to be more active, constructive, and efficient is very crucial for the development of a nation. In line with this vision, the Physics Department organised a research-focused workshop on, 'Selected Topics in Mechanics for Physics Teachers' on December 27, 2018.

The instructors of the Workshop were Dr. Asad Abidi, Professor, University of California, USA and Inaugural Holder of the Abdus Salam Chair, (who was the lead trainer) along with Dr. Muhammad Sabieh Anwar, Associate Professor, in the Department of Physics.

The Workshop was a success with over 85 participants from across the country, from cities such as Abbottabad, Faisalabad, Peshawar and Haripur.



BIOLOGY SEMINAR ON DEEP EVOLUTIONARY ANALYSIS AND PREDICTING PROTEIN FUNCTION

Department of Biology organised a seminar on 'Deep evolutionary analysis and predicting protein function' on March 06, 2019. It was hosted by Dr. Aziz Mithani, Associate Professor in the department of Biology. Guest speaker for the event was Dr. Ashar Malik.

Talk abstract: Proteins are molecular machines that carry out all the functions necessary for supporting life. Evolutionary analysis utilises this ubiquitous presence of proteins to delineate shared ancestral relationships, through comparison of proteins carrying out similar functions. Conventionally, this analysis utilises the comparison of protein sequences. This work discusses the use of protein structure comparison to not only

delineate the evolutionary history of proteins with highly diverged sequences but also infer the function of novel proteins based on their structural homology when sequence-based analysis struggles to provide a satisfactory answer.

About the Speaker:

Mr. Malik is currently a postdoc fellow at the Bioinformatics Institute, A*STAR, Singapore where, alongside developing the area of structure-based phylogenetics, he is also working towards the development of methods for adding annotations of clinical significance to genomic data collected from healthy individuals in a national precision medicine programme. Mr. Malik graduated from Massey University in Auckland, New Zealand, with a PhD degree in Biochemistry (computational).

SEMINAR ON THE NEXT REVOLUTION IN SPACE AND INFORMATION TECHNOLOGY



Dr. Azam Arastu, President of Apex Consultants (USA), specialising in aerospace and energy technologies, delivered a talk on Monday March 25, 2019, titled "The Next Revolution in Space and Information Technology". Leveraging about 30

years of experience in the satellite industry in Boeing Space & Defense systems; the talk focused on the evolution of satellite industry in the GEO, MEO and the LEO markets. He discussed the recent trends in small satellites, satellite constellations and Cubesats and also the relevance of these technologies for Pakistan. Furthermore, he suggested a framework under which such technologies can be promoted and developed with

government, industry and academic collaboration.

About the Speaker:

Dr. Arastu recently retired as a senior executive of The Boeing Company where he was a VP of one of the Boeing Space & Defense divisions. He possesses more than 30 years of experience in Space & satellite systems, energy technologies and program management. His technical and managerial expertise is well recognized across the aerospace industry, NASA, USAF, DARPA, JAXA, ESA, AIAA and academia in the field of manned and unmanned spacecrafts, satellite systems and sub-systems design, manufacture, test and launch. Earlier, as chief engineer, he led several teams for major, national and international, space programmes for which he is recognised as a Boeing Technical Fellow and AIAA Associate Fellow.

DEPARTMENT OF MATHEMATICS ORGANISES A WORKSHOP ON 'HIGH PERFORMANCE FINITE ELEMENT SIMULATION BY FEATFLOW'

Dr. Mudassar Razzaq, faculty at the Centre for Advanced Studies in Mathematics (CASM) and Department of Mathematics, organised a one-day workshop on 'High Performance Finite Element Simulation by FEATFLOW' on March 25, 2019. The Workshop was held with the support of Mr. Nouman Zubair, working in High Performance Computing (HPC) at LUMS and Dr. Liudmila Rivkind from Technical University of Dortmund, Germany.

This workshop was aimed at undergraduate and graduate students who wanted to initiate

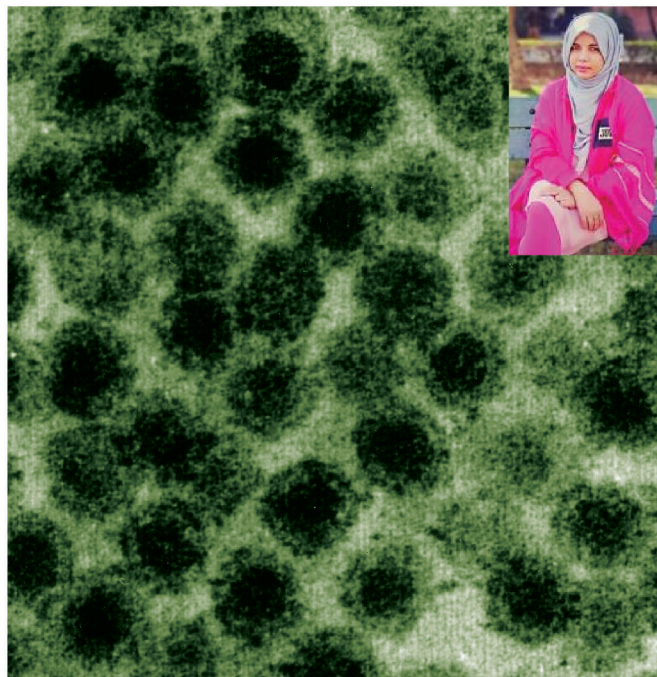
research programmes involving Finite Element Methods (FEM) for multiphysics problems. The participants were also introduced to problems in Computational Fluid Dynamics (CFD), Computational Structure Mechanics (CSM) and Fluid Structure Interaction (FSI).



DISCOVERY OF A POTENTIAL DRUG AGAINST DENGUE VIRUS

A team of researchers working in the Medicinal Chemistry group of the Department of Chemistry and Chemical Engineering, have published a research article, titled, 'Inhibition of Dengue Virus Protease by Eugeniiin, Isobiflorin, and Biflorin from the Flower Buds of *Syzygium aromaticum* (Cloves) in ACS Omega.'

Hafiza Nosheen Saleem, under the supervision of Dr. Muhammad Saeed discovered a natural product (eugeniiin) from cloves as a potent 'hit' for the development of a new medicine for the treatment of the dengue infection. The Nuclear Magnetic Resonance (NMR) facility in collaboration with Dr. Syed Shahzad-ul-Hussan at the Department of Biology played a significant role in the identification and explanation of the drug-target interactions.



CHEMISTRY & CHEMICAL ENGINEERING RESEARCH GROUP EXPLORED THE INHIBITION OF PROTEIN MISFOLDING WITH IMPLICATIONS ON DIABETES TREATMENT

A range of debilitating human diseases including Alzheimer's, Parkinson's and Huntington's disease and type 2 diabetes (T2D) are associated with misfolding of certain proteins and their subsequent aggregation into toxic fibers, called amyloids.

The research group led by Dr. Rahman Shah Zaib Saleem at the Department of Chemistry and Chemical Engineering is currently working on

synthesis and identification of new small organic molecules that can target, bind and prevent hIAPP aggregation, keeping it in its native state. Recent outcome from this project is published in *Bioorganic Chemistry*, a prestigious journal in the field of medicinal chemistry research. The research is titled, 'Synthesis and identification of novel pyridazinylpyrazolone based diazo compounds as inhibitors of human islet amyloid polypeptide aggregation.'

PHD CHEMISTRY STUDENTS REPORTED THE POTENTIAL USE OF NANOMATERIALS TO COMBAT DRUG RESISTANT BACTERIA

The Functional Nanomaterials Group, led by Dr. Irshad Hussain, faculty at the Department of Chemistry and Chemical Engineering, has been working on the nanoscale engineering of metal nanoparticles. The findings of the group have been published recently, as two research articles.



Zil-e-Huma, a PhD student at SBASSE, published a research article on the design and synthesis of cationic silver nanoclusters that were found to be

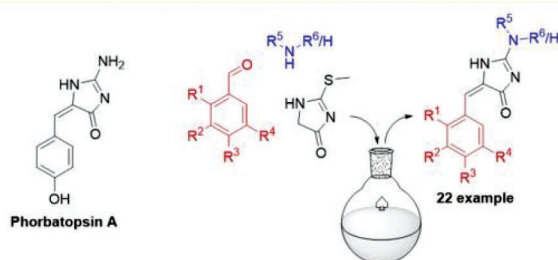
very effective in killing resistant bacterial strains (12 strains tested) at a very low concentration. The research was published in ACS Omega, a scientific journal published by the American Chemical Society and was selected by the editor for 'ACS Editors' Choice.'

In a second article, Dr. Shazia Mumtaz, a recent graduate of the Functional Nanomaterials Group, and a researcher at the University of Massachusetts (UMass), Amherst, USA, reviewed the use of nanomaterials for combatting antibiotic resistant bacteria. The tutorial review was published recently in Chemical Society Reviews, a journal ranked among the top five Science journals globally.

THE ORGANIC CHEMISTRY GROUP PUBLISHED A NOVEL, ONE-POT, THREE-COMPONENT REACTION

Methodology development is a strong research interest of the Organic Chemistry Research Group led by Dr. Rahman Shah Zaib Saleem at the Department of Chemistry and Chemical Engineering. The group is seeking to use multicomponent reactions (MCRs) to address a common obstacle in synthetic chemistry: efficient, clean synthesis to obtain multifunctional compounds. In this regard, the team has developed a one-pot three-component reaction to synthesise 2-aminoimidazolones - a structure that is found in many natural products with demonstrated biological activities. This research work was carried out by Ms. Ansa Haneef

as a part of her Master's degree, Ms. Aniqā Sardar, a teaching fellow and Ms. Haniya Tariq, currently a chemistry junior.



SPIE STUDENT CHAPTER CONDUCTED OUTREACH FOR PROMOTION OF OPTICS AND PHOTONICS IN SCHOOLS

SPIE, the international society for optics and photonics, collaborates with researchers, educators, and industry to advance light-based research and technologies for the betterment of the human condition. The SPIE student chapter at LUMS takes this aim forward by reaching out to students of various schools and creating an interest in the study of optics.

SPIE LUMS recently arranged two outreach activities for optics education for school children in Lahore. The first activity was held at Government High School, Chung Khurd, (near LUMS) in Lahore on February 7, 2019, and the second activity was

organised at Syedanwala Higher Secondary School, Syedanwala, Kasur on February 9, 2019.

The activities educated the primary and secondary level students about the nature of light and its properties. Four SPIE chapter officers, Muhammad Kamran, Ali Raza Mirza, Aamir Hayat and Ubaid Ullah arranged these activities, which comprised of basic experiments using locally available items, conducted to show scattering, dispersion, guided propagation, and the nature of light. Students enjoyed and participated in these activities as it created an interest in them to understand the experiments related to light and optics.

CS STUDENTS WIN AWARD AT SOFTEC 2019

Eighty-two teams came together to compete against each other in the programming competition of the 23rd edition of SOFTEC '19. The programming competition is one of the oldest categories of the event, where two teams from LUMS reached the top ten.

The winning LUMS team comprising Computer Science majors from the batch of 2020, Ammar Tahir, Mohammad Hamza and Sheikh Abdul Mannan, brought home the much sought after trophy for the programming competition.

SOFTEC is an annual event organised by FAST-NU Lahore Campus. It aims to promote the advancement of Information Technology and the propagation of its benefits amongst all. The event has been able to provide a forum for the exchange of

ideas, an environment to showcase exceptional skill and a platform for innovation to students and professionals alike. SOFTEC is one of the biggest IT events held in Pakistan as it boasts competitions ranging from programming, web and applications development to data science and engineering projects.



FACULTY NEWS:

FACULTY PROMOTION:



Dr. Ghayoor Abbas Chotana has been promoted to tenured Associate Professor in the Department of Chemistry and Chemical Engineering.

WELCOME ON BOARD:



Dr. Karmon Bohos Tzalikian has joined as a Visiting Associate Professor in the Department of Physics.



Dr. Shaheena Bashir has joined as an Associate Professor in the Department of Mathematics.



Dr. Afzal Muhammad Dogar has joined as an Associate Professor on Tenure Track in the Department of Biology.



Dr. Syed Moez Hassan has joined as an Assistant Professor on Tenure Track in the Department of Physics.

STAFF NEWS:

Ms. Ezza Khan has joined as Lab Instructor in the Department of Biology.

Ms. Saira Naz, Senior Officer in Office of the Dean SBASSE, has left LUMS after 2 years of service.

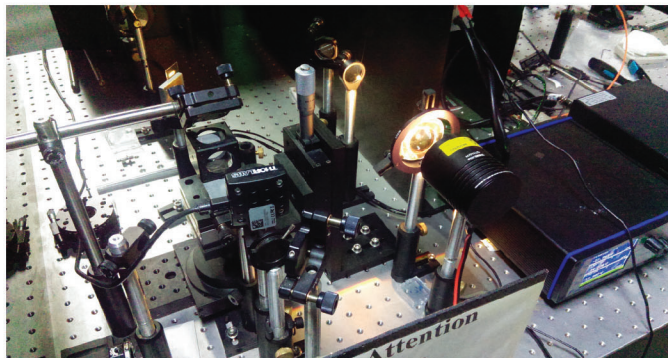
PHD THESIS DEFENCE:

We are glad to share the news of successful PhD defence of the following students and wish them all the best in their future endeavors.

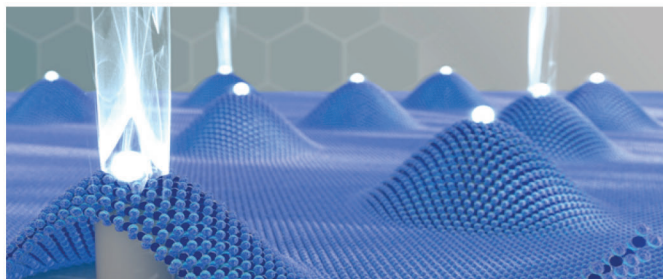
- **Adil Zia Khan**, PhD in Computer Science from Department of Computer Science
Title: Receiver Driven Scheduling for Datacenters.
- **Syed Muhammad Irteza**, PhD in Computer Science from Department of Computer Science
Title: Resilient Network Load Balancing for Datacenters.
- **Mira Tul Zubaida Butt**, PhD in Chemistry from Department of Chemistry and Chemical Engineering
Title: Fabrication and Characterisation of Metal Halide Perovskite Based High Efficiency Solar Cells.
- **Muhammad Shoaib Anwar**, PhD in Mathematics from Department of Mathematics
Title: Modelling and Numerical Simulation of some Fractional Non-Linear Viscoelastic Flow Problems.

QUANTUM AND NANO-PHOTONICS LAB

Understanding fundamental processes and interactions at the nanoscale holds the key to solutions for several 21st century technological challenges. The domain of impact encompasses a wide range of applications such as advances in medicine, computing, communication and energy.



The Nano-photonics lab in the SBASSE Physics department uses light and spectroscopic techniques to study fundamental processes at the nanoscale. Activities of the nano-photonics lab include the fabrication and optical characterization of functional nanostructured devices made from compound semiconductors (quantum dots), hybrid perovskites, two dimensional nanomaterials (di-chalcogenides and graphene) and self-assembled liquid crystalline materials. These materials offer rich opportunities for fundamental research of light-matter interaction down to the ultimate quantum limit. The lab includes state-of-the-art home-built facilities such as Photoluminescence and Raman spectroscopy setups capable of high spatial and spectral resolution spectroscopy.



Current projects in the lab include development of frequency stable quantum light sources using two-dimensional semiconducting materials and colloidal quantum dots. The work includes utilization of various photonic geometries to enhance quantum efficiency of the fabricated devices. The lab also performs experiments in optical spin pumping to realize spin-based quantum logic devices based on valley-tronics and is also developing Raman spectroscopy and Raman imaging for local biochemical analysis of single living cells. Furthermore, researchers are working on fabrication and testing of self-assembled nematic and discotic liquid crystals in two-dimensional semiconductor hybrid electro-optic as well as photovoltaic (perovskite) devices.



Activities in the nano-photonics laboratory are managed by Dr. Ata Ul Haq and Dr. Ammar Khan from the Department of Physics, with additional support of the Department of Physics Workshops, Central Lab Facilities, and collaborations with the Chemistry and Biology department.



Dr. Ata Ul Haq



Dr. Ammar Khan

SYED BABAR ALI SCHOOL OF SCIENCE AND ENGINEERING

Lahore University of Management Sciences
Opposite Sector, U, Defence Housing Authority (DHA),
Lahore, 54792

Phone: 042-35608000 Ext: 8344

E-mail: deansbasse@lums.edu.pk

URL: <https://sbasse.lums.edu.pk>