Proceedings

"One Week Training Program on DST Supported Advanced Research Instruments"

"डी.एस.टी समर्थित उन्नत अनुसंधान उपकरणों पर एक सप्ताह का प्रशिक्षण कार्यक्रम"

(July 18 - 24, 2022)

Synergistic Training program Utilizing the Scientific and Technological Infrastructure (STUTI)

Azadi Ka Amrit Mahotsav

ALIGARH MUSLIM UNIVERSITY, ALIGARH

supported by

Department of Science & Technology, Government of India

Prof. Mohammad Gulrez
Pro-Vice Chancellor,
AMU Aligarh

Chief Guest
Prof. Avinash C. Pandey
Director, IUAC, New Delhi

Prof. Mohammad Ashraf
Dean,
Faculty of Science, AMU

DEPARTMENT OF PHYSICS, AMU, ALIGARH

Prof. B.P. Singh *PMU Coordinator* *Chairperson,* *Department of Physics,* *AMU, Aligarh*	*Dr. M. Wasi Khan* *Convener* *Associate Professor,* *Department of Physics,* *AMU, Aligarh*	*Dr. Jai Prakash* *Convener* *Assistant Professor,* *Department of Physics,* *AMU, Aligarh*

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ORGANIZING COMMITTEE

Prof. Tariq Mansoor Chief Patron Vice-Chancellor, Aligarh Muslim University, Aligarh (UP)	
Prof. Mohammad Gulrez Patron Pro-Vice Chancellor, Aligarh Muslim University, Aligarh (UP)	
Prof. Mohammad Ashraf Co-Patron Dean, Faculty of Science & Chairperson, Department of Mathematics, Aligarh Muslim University, Aligarh (UP)	
Prof. Avinash C. Pandey Chief Guest Director, Inter-University Accelerator Centre (IUAC), New Delhi	
Prof. B. P. Singh Chairperson, Department of Physics & PMU Coordinator – STUTI Project Aligarh Muslim University, Aligarh (UP)	
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Dr. Jai Prakash Convener - STUTI Training Program Assistant Professor, Department of Physics, Aligarh Muslim University, Aligarh (UP)	

SPEAKERS

Prof. B. P. Singh Chairperson, Department of Physics & PMU Coordinator – STUTI Project Aligarh Muslim University, Aligarh (UP)	
Dr. Subir Nath Scientist-G Inter-University Accelerator Centre (IUAC), New Delhi	
Prof. Shahid Husain Department of Physics Aligarh Muslim University, Aligarh (UP)	
Prof. Absar Ahmad Interdisciplinary Nanotechnology Centre (INC), Aligarh Muslim University, Aligarh (UP)	
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Dr. D.K. Shukla Scientist-F UGC-DAE CSR, Indore	

Dr. Jai Prakash Convener - STUTI Training Program Assistant Professor, Department of Physics, Aligarh Muslim University, Aligarh (UP)	
Dr. Gautam Singh Associate Professor, Amity Institute of Applied Sciences, Amity University, Noida	
Dr. S. K. Gupta Assistant Professor, Department of Physics, Aligarh Muslim University, Aligarh (UP)	

ABOUT THE STUTI TRAINING PROGRAM

Synergistic Training program Utilizing the scientific and Infrastructure (STUTI) scheme is intended for the capacity building of human resources through open access to Science & Technological infrastructure across the country by organizing specialized training programs on DST-supported R&D equipment targeting Ph.D. Scholars, Post-Doctoral Fellows, Scientists, Faculty, etc. are actively involved in intensive research. The role of Science and Technology is pivotal for the evolution of mankind. The program is being organized as part of Azadi ka Amrit Mahotsav. The program consists of both theory as well as hands on training with various instruments, supported by DST and FIST. The uniqueness of the program includes minimum four hours theory and remaining 50% of the duration is on practical training on the equipment. Effort would be made for hands-on use of equipment for demonstration/ characterization by each participant. The program's aim is to promote the research collaborations to the maximum extent. The program will be open to a broad audience interested in acquiring in-depth knowledge on the analytical instruments such as XRD, TEM, SEM, EDX, NMR, UV-visible spectroscopy, FTIR spectroscopy, Polarizing optical microscopy, TGA/DSC, etc. After completion of the workshop, participants can appreciate how these techniques help in understanding materials, correlating structure-property relation and eventually for elucidating the structure of existing and newly discovered materials. This will not only enable them to build up a fundamental thought process of characterization techniques but also help in interpreting their own research findings more efficiently. This training program provides a platform for interaction and exchange of innovative ideas on current trends in the fields of Science and Technology. Lectures / Training sessions have been delivered by the eminent subject experts/faculty members of the fields.

ABOUT ALIGARH MUSLIM UNIVERSITY

Aligarh Muslim University (AMU) is a public central university in Aligarh, Uttar Pradesh, India. AMU occupies a unique position amongst universities and institutions of higher learning in the country. It was established in 1920 and evolved out of the Mohammedan Anglo-Oriental (MAO) which was set up on 7 January 1877 by the great visionary and social reformer, Sir Syed Ahmad khan. From its very inception, it has kept its door open to the members of all communities and from all corners of the country and the world. The Aligarh Muslim University is the realization of a vision which was broad, far-reaching and realistic.

Spread over 467.6 hectares in the city of Aligarh, Uttar Pradesh, Aligarh Muslim University offers more than 300 courses in the traditional and modern branches of education. It draws students from all states in India and from different countries, especially Africa, West Asia and Southeast Asia. In some courses, seats are reserved for students from SAARC and Commonwealth Countries. The University is open to all irrespective of caste, creed, religion or gender. It ranks 8th among the top 20 research universities in India.

In spite of the establishment of a number of universities and institutions of higher learning all over the country, this University has been maintaining its national and international character as an institution of excellence. It has more than 37327, students, 1,686 teachers and some 5,610 non-teaching staff on its rolls. The University now has 13 faculties comprising 117 teaching departments, 3 academies and 21 centres and institutes. A special feature of the University is its residential character with most of the staff and students residing on the campus. There are 19 halls of residence for students with 80 hostels.

Apart from the conventional Undergraduate and Postgraduate courses in Social Sciences, Sciences and Humanities, the University keeps pace with the nation's growth by offering facilities for specialized learning in areas of technical, vocational and interdisciplinary studies. It has the Zakir Hussain College of Engineering and Technology, Jawaharlal Nehru Medical College, Dr. Ziauddin Ahmad Dental College, Institute of Ophthalmology, Food Craft Institute, Interdisciplinary Biotechnology Unit, Centre of Advanced Study in History, Department of West Asian Studies, Centre of Wildlife, Centre for South African & Brazilian Studies, Department of Islamic Studies, Academic Staff College, Women's College, Ajmal Khan Tibbiya College, Polytechnics separately for boys and girls and Computer Centre etc.

On 24 May 1875, Sir Syed founded the Madarsatul Uloom in Aligarh and patterned the MAO after Oxford and Cambridge universities that he went on a trip to London. His objective was to build a university in line with the British education system but without compromising its Islamic values.

The University has opened three new centres of study outside Aligarh at Murshidabad, West Bengal state, at Mallapurum, Kerala state and at Kishanganj, Bihar State.

The University maintains one primary, seven High schools (including one for the Visually Challenged), and two Senior Secondary schools for boys and girls. The

University also offers courses in Indian, Oriental and Western Languages. The medium of instruction in the University is primarily English.

Games and sports have been a distinctive feature of the AMU. The Skating and Riding teams have excelled at the inter-University level. Perhaps this is the only University with a Riding Club. The General Education centre is the nucleus of most of the extra-curricular activities and caters to the cultural environment. This centre organizes these activities through its various clubs viz., the AMU Literary Club, the Hindustani and Western Club, the Literary Club and the Hobbies Workshop etc. It is proudly Islamic and proudly Indian institution: a living symbol of the composite culture of India and a bulwark of its secular principles.

ABOUT DEPARTMENT OF PHYSICS

The Physics Department of the Aligarh Muslim University, Aligarh (UP), India was established in 1912. The Department has rich teaching and research traditions since its inception and the first Ph.D. in Physics was awarded in 1926. Eminent Scientists who at some point of time were the faculty member / student of the Department are Prof. Wali Mohammad, Prof. Rudolf Samual, Prof. P. S. Gill, Prof. R. K. Asundi, Prof. P. Venkateshwarlu, Prof. A. N. Mitra, Prof. H. S. Hans, Prof. Rais Ahmad, Prof. M. Z. R. Khan, Prof. M. L. Sehgal, Prof. P.I. John (Padam Shri), Prof. M.S.Z. Chaghtai, Prof. M. Shafi, Prof. Israr Ahmed, Prof. S. K. Singh, Prof. Tariq Aziz, Prof. R. Prasad, Prof. Siraj Hassan, Prof. M. Sami etc. Presently there are 8 Professors, 8 Associate Professors, 14 Assistant Professors, 4 Guest Teachers and about 60 Research Scholars in the Department.

The Department offers six semesters undergraduate B. Sc. (Hons.) and four semesters postgraduate M. Sc. courses. The choice-based credit system (CBCS) has been implemented. The intake for the undergraduate and post graduate programmes is 120 and 50 respectively. Besides these, the Department also offers Ph.D. program in various research areas of experimental and theoretical physics.

Over the years, the growing international reputation of the Department has enabled it to join several international collaborations such as ALICE, CBM, PANDA etc., with Universities like University of Valencia, Spain; University of Tokyo, Japan; Universitat Erlangen, Germany etc. The faculty members are also involved in national collaborations viz. India based Neutrino Observatory Project. Faculty members are also

collaborating with the scientists working at TIFR Mumbai, BARC Mumbai, IUAC New Delhi, VECC Kolkata, IUCAA Pune, UGC-DAE-CSR Kolkata & Indore, JNU New Delhi, IIT-Bombay, IIT-Ropar etc.

The Department's illustrious legacy and its continuous stride in academic excellence over many decades have been duly acknowledged by the University Grants Commission, New Delhi, India and Department of Science & Technology, New Delhi, India resulting in the endowment of financial assistance through schemes such as DRS-SAP, DSA phases I, II & III, COSIST, FIST and PURSE. These grants have helped the Department in strengthening the infrastructure and the procurement of state-of-the-art instruments for research as well as undergraduate and postgraduate laboratories. Some of the important instruments in various laboratories are FTIR (Tensor 37, Bruker) Spectrometer, X-ray Diffractometer (6100-Shimadzu), Scanning Microscope (DM 2500 M & DM 6000 M), High Power Nd: YAG Laser (Brilliant B), Telescope (CGE Pro 14"), UV-VIS-NIR Spectrometer (Lambda 950, Perkin Elmer), Simultaneous Thermal Analyser (STA- 8000, Perkin Elmer), Andor Mechelle 5000 Monochromator with ICCD and Acton 0.5 Monochromator attached with PMT, Cryo-cooler for low temperature measurement, alpha, beta and gamma spectrometers etc.

The Department has an excellent seminar library with more than 13,000 reference books and nearly 10,000 bound journals. The seminar library has seating capacity of one hundred persons and about 400 memberships of students and teachers.

Research in the Department is being pursued in many of the major contemporary areas of experimental and theoretical physics, viz, Nuclear Physics, High Energy Physics, Atomic and Molecular Physics, Condensed Matter Physics, Astrophysics, Photonics and Non-Linear Dynamics.

TOPICS COVERED

The training programme includes lectures on the: Introduction to Nanomaterials; Synthesis and characterization; Basics of characterization techniques; Physics of Graphene; Photocatalytic applications of oxide materials; Tuning of physical properties of some specific materials; Liquid crystal materials: Measurements and characterization tools; Interaction of nuclear radiation with matter; Fundamentals of radiation detectors. The programme also includes hand-on-training on: Synthesis of Nanomaterials; X-ray diffractometer (XRD); Thermal Analysis (STA) System; Low and High temperature resistivity setups; Polarizing optical microscope; LCR meter; α, β and γ spectrometers; etc.

One Week Training Program on DST Supported Advanced Research Instruments

Under

Synergistic Training Program Utilizing the Scientific and Technological Infrastructure (STUTI)

18th July to 24th July 2022

Sponsored by: Department of Science & Technology (DST), Gov. of India

Organized by

Department of Physics, Aligarh Muslim University, Aligarh

09:30AM – 10:00AM	REGISTRATION **[Day 1 Monday, July 18, 2022]**
Inauguration Session ** [Day 1 Monday, July 18, 2022 @ 10:00 AM - 11:30 AM]	
Time (IST)	**Event**
10:00-10:05 hrs	Recitation from the Holy Quran
10:05-10:20 hrs	Welcome Address by the Chairman & PMU Coordinator, Prof. B. P. Singh
10:20-10:30 hrs	Introduction to the STUTI program by Dr. M. Wasi Khan
10:30-10:40 hrs	Address by Dean, Faculty of Science, Prof. Mohammad Ashraf
10:40-10:50 hrs	Address by the Chief Guest, Prof. Avinash C. Pandey
10:50-11:05 hrs	Address by the Pro Vice Chancellor, Prof. Mohammad Gulrez
11:05-11:10 hrs	Release of Brochure by the Chief Guest, Prof. Avinash C. Pandey
11:10-11:20 hrs	Vote of Thanks by Dr. Jai Prakash
11:20-11:30 hrs	University Tarana & National Anthem

One Week Training Program on DST Supported Advanced Research Instruments

July 18-24, 2022 (7 Days)

Programme Schedule

Program Coordinators: Dr. M. Wasi Khan and Dr. Jai Prakash

(Venue: Conference Hall, Physics Department)

Date	Review Session 09:30-10:00 AM	Session – I 10:00 -11:30 AM	Tea Break	Session - II 12:00-1:30 PM	Lunch Break	Hands on Training		Tea Break
						Session – III 2:30-4:00 PM	Session-IV 4:00-5:00 PM	
July 18, 2022 (Monday)	REGISTRATION	Inaugural function		TALK-1 Dr. Subir Nath		TALK-2 Dr. D. K. Shukla	Participants Interaction & Overview of the EQUIPMENT AVAILABLE	
July 19, 2022 (Tuesday)	ASSIGNMENT COLLECTION	TALK-3 Dr. Subir Nath		TALK-4 Dr. Jai Prakash		GROUP-1 (NP LAB) GROUP-2(CMP LAB) GROUP-3(LC LAB)		
July 20, 2022 (Wednesday)	ASSIGNMENT COLLECTION	TALK-5 Prof. Absar Ahmad		TALK-6 Dr. M. Wasi Khan		GROUP-2 (NP LAB) GROUP-3(CMP LAB) GROUP-1(LC LAB)		
July 21, 2022 (Thursday)	ASSIGNMENT COLLECTION	TALK-7 Dr. M. Wasi Khan		TALK-8 Prof. Shahid Husain		GROUP-3 (NP LAB) GROUP-1(CMP LAB) GROUP-2(LC LAB)		
July 22, 2022 (Friday)	TALK-9 Prof. Shahid Husain (9:30-11:00 AM)	TALK-10 Dr. Sudhir K. Gupta (11:15 AM-12:45 PM)		Break		Participants may visit NP, CMP, & LC Labs as per their interest		
July 23, 2022 (Saturday)	ASSIGNMENT COLLECTION	TALK-11 Dr. Gautam Singh		TALK-12 Dr. Gautam Singh		VISIT TO CAMPUS/LABS /LIBRARY/ MEETING WITH DEAN, FACULTY OF SCIENCE		
July 24, 2022 (Sunday)	TEST OF UDERSTANDING	TALK-13 Prof. B. P. Singh		TALK-14 Dr. S. S. Z. Ashraf		FEEDBACK SESSION	Valedictory Session	

S.No.	Talk No.	Speakers	Title of Talk/Activity
1.	Talk-1	**Dr. Subir Nath** Inter-University Accelerator Centre (IUAC), New Delhi	*Accelerator-based nuclear physics research at IUAC*
2.	Talk-2	**Dr. D. K. Shukla** UGC-DAE Consortium for scientific research, Indore	*Synchrotron X-ray radiation-based materials characterization methods*
3.	Talk-3	**Dr. Subir Nath** Inter-University Accelerator Centre (IUAC), New Delhi	*Physics with recoil separators*
4.	Talk-4	**Dr. Jai Prakash** AMU, Aligarh	*The fascinating world of liquid crystal*
5.	Talk-5	**Prof. Absar Ahmad** AMU, Aligarh	*Translational research on bio inspired nanomaterials & drugs from endophytes*
6.	Talk-6	**Dr. M. Wasi Khan** AMU, Aligarh	*Transmission electron microscopy (TEM): A versatile tool for nanomaterials characterization*
7.	Talk-7	**Dr. M. Wasi Khan** AMU, Aligarh	*Transmission electron microscopy (TEM): A versatile tool for nanomaterials characterization*
8.	Talk-8	**Prof. Shahid Husain** AMU, Aligarh	*X-ray diffraction: A probe for structural analysis*
9.	Talk-9	**Prof. Shahid Husain** AMU, Aligarh	*Role of dielectric measurements in materials characterization*
10.	Talk-10	**Dr. Sudhir Kumar Gupta** AMU, Aligarh	*The supersymmetric Universe*
11.	Talk-11	**Dr. Gautam Singh** Amity University, Noida	*Liquid crystal nanoscience: Recent advances and future perspectives*
12.	Talk-12	**Dr. Gautam Singh** Amity University, Noida	*Characterization tools for liquid crystals and their composites*
13.	Talk-13	**Prof. B.P. Singh** AMU, Aligarh	*Basics of the experimental study of nuclear reaction dynamics at low energies in light and heavy ion reactions*
14.	Talk-14	**Dr. S. S. Z. Ashraf** AMU, Aligarh	*Graphene: A prototype Dirac matter*

PARTICIPATING INSTITUTES

S. No.	State/Country	Institutes	No. of Registered Participants
1.	Uttar Pradesh	Aligarh Muslim University, Aligarh	03
		DSN College, Unnao	01
		Chaudhary Charan Singh University, Meerut	03
		IIT-BHU, Varanasi	04
		GLA University, Mathura	01
		Madan Mohan Malviya University of Technology, Gorakhpur	01
		Veer Bahadur Singh Purvanchal University, Jaunpur	01
2.	Himachal Pradesh	Shoolini University, Solan	01
3.	New Delhi	National Physical Laboratory	01
		Jamia Millia Islamia	01
		University of Delhi	02
4.	Bihar	Central University of South Bihar	01
		Bhupendra Narayan Mandal University, Madhepura	01
		Veer Kunwar Singh University, Ara	01
5.	Madhya Pradesh	Dr. Hari Singh Gour University, Sagar	02
		Indira Gandhi National Tribal University, Amarkantak	01
6.	Tamil Nadu	Edayathangudy G.S Pillay Arts and Science College, Nagapattinam	01
		K.S. Rangasamy College of Arts and Science (Autonomous), Tiruchengode	01
7.	Haryana	Guru Jambheshwar University of Science and Technology, Hisar	01
8.	Punjab	Chandigarh University, Chandigarh	01

9.	Nagaland	Nagaland University, Lumami	01
TOTAL			**30**

PARTICIPATING INSTITUTES

ORGANIZERS REPORT

on

"One Week Training Program on DST Supported Advanced Research Instruments"

July 18-24, 2022

Coordinator

Prof. B. P. Singh

Conveners

Dr. M. Wasi Khan & Dr. Jai Prakash

BACKGROUND

The week-long "One Week Training Program on DST Supported Advanced Research Instruments" held during July 18 – 24, 2022 at the ALIGARH MUSLIM UNIVERSITY, ALIGARH, INDIA, under the "Synergistic Training program Utilizing the scientific and Technological Infrastructure (STUTI)" supported by the Department of Science and Technology (DST), Government of India started with the inauguration programme on 18.07.2022 in the Conference Hall of the Physics Department were culminated on 24.07.2022.

As part of the "Azadi Ka Amrit Mahotsav" celebrations, in the training programme held, the scientific lectures, demonstrations and hands on training sessions were organized for the benefit of the faculty members/research scholars/scientists of nearby colleges/universities on the DST sponsored FIST supported equipment.

In the week-long awareness programmes, 30 participants with different disciplines from different parts of the country participated in the programme. Scientific talks on diverse topics of research were delivered by Dr. Subir Nath from Inter-University Accelerator Centre (IUAC), New Delhi, Dr. D. K. Shukla from UGC-DAE CSR, Indore, Prof. B.P. Singh, Prof. Absar Ahmad, Prof. Shahid Husain, Dr. S.S.Z. Ashraf, Dr. M. Wasi Khan, Dr. Jai Prakash and Dr. Sudhir Kumar Gupta from AMU, Aligarh and Dr. Gautam Singh from Amity University, Noida.

WELCOME AND OPENING ADDRESSES

Prof. B. P. Singh, PMU Coordinator - STUTI Program & Chairperson, Department of Physics, Aligarh Muslim University, Aligarh welcomed Prof. Mohammad Gulrez, Pro-Vice Chancellor, Aligarh Muslim University, Aligarh, Guest of Honor, Prof. Mohammad Ashraf, Dean Faculty of Science & Chairperson Department of Mathematics and Chief Guest, Prof. Avinash C. Pandey, Director, Inter-University Accelerator Centre (IUAC), New Delhi, Faculty members of the Department of Physics and all the Participants.

Chief Guest, Prof. Avinash Chandra Pandey, the Director, Inter University Accelerator Centre, New Delhi inaugurated the programme. The brochure of the week-long programme was also released by the chief guest in the inaugural function. Pro Vice Chancellor, Prof. Mohammad Gulrez presided the inaugural function and expressed his valuable thoughts on the occasion. The guest of honor, Prof. Mohammad Ashraf, Dean Faculty of Science discussed the importance of such training programme in context of growth of early career researchers. Prof. B. P. Singh, Chairperson, Physics Department highlighted the importance and usefulness of Training Programme. Dr. M. Wasi Khan, Convener - STUTI Training Program introduced the STUTI initiative of DST to the participants and students and discussed its main features and components. Dr. M Wasi Khan said the program is designed for the participants of various institutes across the country. Dr. Jai Prakash conducted the proceedings of inaugural function and convened all the activities undertaken under this Training Programme.

While presenting a bouquet to honorable Pro Vice Chancellor, Aligarh Muslim University, Aligarh, Prof. Mohammad Gulrez (Inaugural function)

While releasing the Brochure of One Week Training Program on DST Supported Advanced Research Instruments

Participants and audience attending the inaugural function of One Week Training Program on DST Supported Advanced Research Instruments

Pro Vice Chancellor, Aligarh Muslim University, Aligarh, Prof. Mohammad Gulrez presenting a memento to Chief Guest Prof. Avinash C. Pandey, Director, IUAC, New Delhi

PMU Coordinator Prof. B. P. Singh presenting a memento to Dean Faculty of Science, AMU

DAY 1

The inaugural function of the programme was conducted at the Department of Physics, Aligarh Muslim University, Aligarh at 10.00 AM in the conference hall of the department keeping Covid 19 protocols into mind. Prof. Avinash Chandra Pandey, the Director, Inter University Accelerator Centre, New Delhi was the Chief Guest of the programme. Dr. Pandey presented his valuable views on the occasion. He highlighted the long association of AMU Aligarh with IUAC, New Delhi through the utilization of research facilities at IUAC by AMU faculty and research scholars. Prof. Pandey also mentioned the contribution of early AMU Physics faculty in the inception of IUAC. He emphasized on capacity professional development, which is also initiative of Govt. of India, through multidisciplinary research. He also proposed to have AMU-IUAC common recruitment of faculty to continue collaborative research. He subsequently released the brochure of the week-long programme.

Pro Vice Chancellor, Prof. Mohammad Gulrez appreciated the achievement and long legacy of the Physics department in his presidential address. He quoted the famous quote of Charles Darwin in context with the adoption of change with reference to work in a collaborative manner. He also ensured to provide all possible support by the University to the department for conducting quality research and organization of such science outreach activities.

The guest of honor, Prof. Mohammad Ashraf, Dean Faculty of Science discussed the importance of such training programme in context of growth of early career researchers. He congratulated Physics Department for getting STUTI Project by DST, New Delhi and organizing a week-long program for youngsters.

Prof. B. P. Singh, Chairperson, Physics Department, welcomed the Chief guest and all the faculty members as well as participants of the training programme. At the very start of the programme Prof. Singh highlighted the importance and usefulness of organizing training programme. He also narrated the importance of scientific temperament and scientific spirit for the development of technological applications.

Dr. M. Wasi Khan introduced the STUTI initiative of DST to the audience and students and discussed its main features and components. Dr. Jai Prakash, as one of the conveners, convened the activities undertaken “One Week Training Program on DST Supported Advanced Research Instruments” in the department. He also presented vote

of thanks in the end of the inaugural function.

Convener, Dr. Jai Prakash while conducting the proceedings of inaugural function of One Week Training Program on DST Supported Advanced Research Instruments

PMU Coordinator, Prof. B. P. Singh while presenting welcome address in inaugural function

Dean, Faculty of Science, Prof. M. Ashraf, while presenting his address during inaugural function of the program

The first lecture of the training program began in the second session after the successful completion of the opening ceremony, where eminent scientist Dr. Subir Nath, IUAC, New Delhi delivered an outstanding lecture on "Accelerator-Based Nuclear Physics Research at IUAC". In his speech, he discussed in detail two large particle accelerators - a 15UD Pelletron and a superconducting linear accelerator located at the IUAC. He explained the major experimental facilities available at IUAC, Indian National Gamma Array (INGA), National Array of Neutron Detectors (NAND), General Purpose Scattering Chamber (GPSC), Heavy Ion Reaction Analyzer (HIRA) and HYbrid Recoil mass Analyzer (HYRA).

Chief guest, Prof. A. C. Pandey, Director, IUAC, New Delhi while presenting his address in inaugural function

The third session started post lunch, where Dr. D. K. Shukla delivered an excellent lecture on "Synchrotron X-ray Radiation Based Material Characterization Methods". He discussed the importance of synchrotron radiation and discussed its wide applications. He also explained some aspects of diffraction and scattering and discussed X-ray absorption and photoelectron emission-based spectroscopy in detail.

Dr. Subir Nath, IUAC, New Delhi while presenting his talk

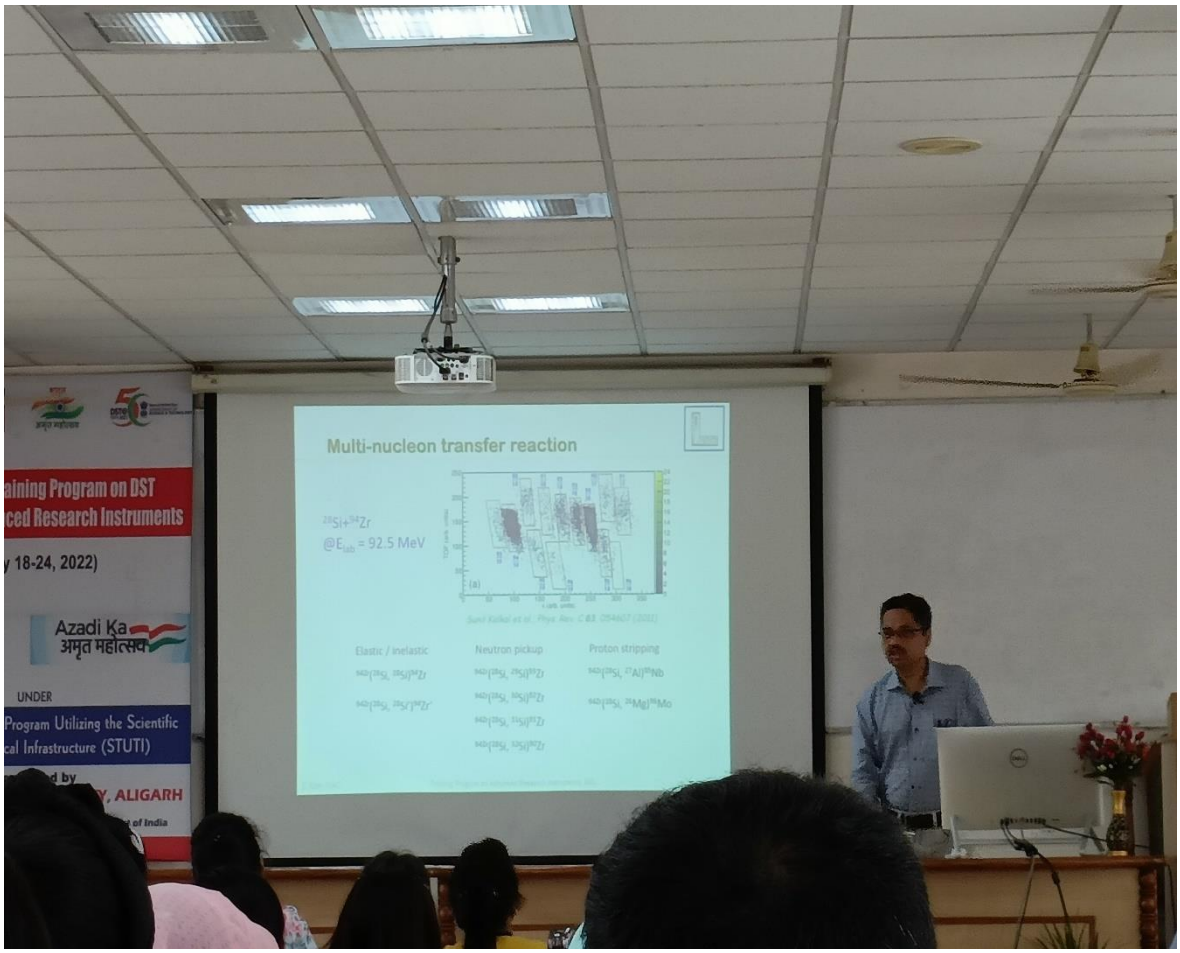
The fourth session was mainly devoted to interacting with the participants and giving them a brief overview of the equipments available in the Department of Physics, AMU. The objective was to make the participants comfortable with their colleagues coming from different parts of the country and to give them a comfortable environment in the campus.

The day ended with High Tea where the students interacted with each other and discussed each other's research work. With the efforts of all the members of the organizing committee, the training program of the first day went smoothly and succeeded in its objective of providing systematic training to the students and hence was a great success.

DAY 2

The first sessoin of the second day again started with the lecture of Dr. Subir Nath on "Physics with Recoil Separators". In his talk, he discussed the importance of Recoil separators in the separation and detection of reaction products formed in heavy ion-induced reactions amidst large background events. In addition, he also elaborated the the Heavy Ion Reaction Analyzer (HIRA) and the HYbrid Recoil mass Analyzer

(HYRA) located in the IUAC and discussed the use of these recoil separators to investigate sub-barrier fusion dynamics, multi-nucleon transfer and fusion-fission. He focused on giving a detailed description of the working of recoil separators and most of the information related to it.

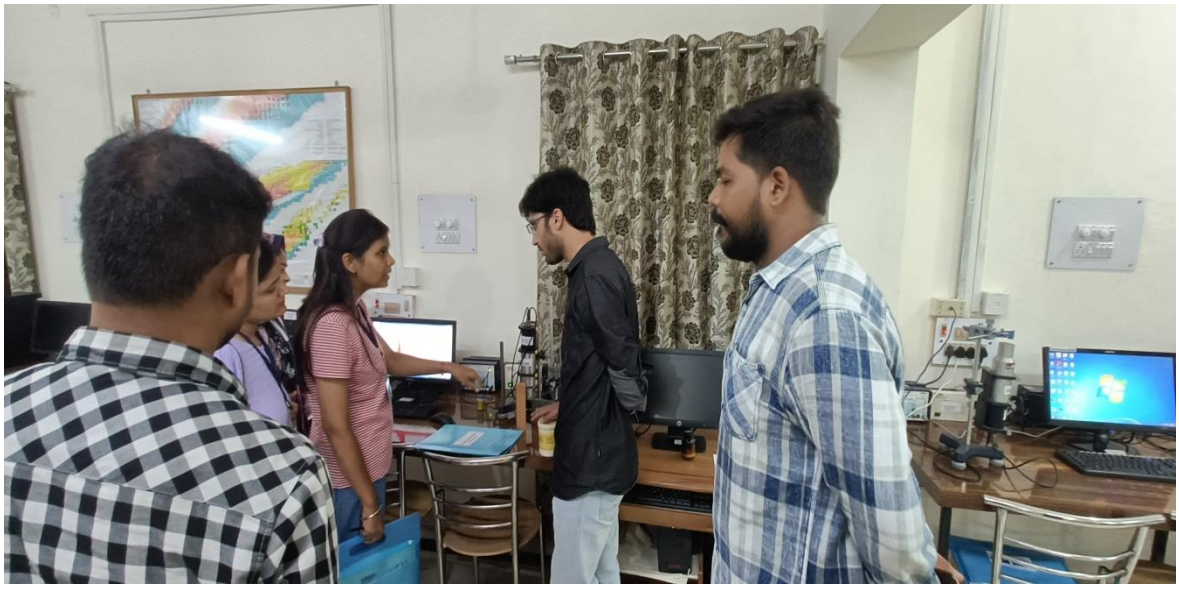


Dr. Subir Nath, IUAC, New Delhi while presenting his talk on Day 2

The second lecture of the day was delivered by Dr. Jai Prakash, Department of Physics, AMU on "The fascinating world of liquid crystal". In his talk, he discussed in depth the properties of Liquid Crystal (LCs) and its applications. He talked extensively about the crystalline properties of LCs such as anisotropy of optical, electrical and the magnetic properties and also some typical properties of the liquid such as the inability to support shear, formation and the coalescence of the droplets. He also introduced different categories of the LCs such as nematics, smectics, columnar and the cholesteric mesophases. He briefly discussed the difference between the ferroelectric LCs and the LCs formed using nematic type LC materials and discussed the advantage of using ferroelectric LCs over their nematic counterparts such as the good optical contrast, low threshold voltage, faster response time etc.

Dr. Jai Prakash, AMU Aligarh while presenting his talk

This was followed by the third the fourth session which is the most important part of the training program where the participants were given practical training with various high-quality and modern equipments available in various research labs of the Department of Physics, AMU. The participants were divided equally into three groups and they visited three laboratories group-wise: the Liquid Crystal (LC) Laboratory, the Nuclear Physics (NP) Laboratory and the Condensed Matter Physics Laboratory (CMP). In the LC Lab, very sincere and senior research Scholars of the department Mr. Aakash Kumar and Mr. Deepanshu Varshney demonstrated very well the working of "Polarizing Optical Microscope" and provided hands on training to the participants of liquid crystal cell fabrication process and dielectric measurement of liquid crystal materials. Also, the participants were encouraged to conduct the experiments to better understand the operation of the equipment. In the NP Lab, Dr. Mohammad Shuaib and Mohmmad Shariq Asnain explained the working of Alpha, Beta and Gamma spectrometers in detail and gave practical training of the instruments to the students. Lastly, the CMP Lab was conducted by Mr. Mohammad Arshad and Ms. Mehroosh Fatima. They introduced the participants to various characterization techniques such as synthesis of nanomaterials, X-ray diffractometer (XRD), Thermal Analysis (STA) system etc. that the participants learned to use on their own. On the second day, groups 1, 2 and 3 visited NP Lab, CMP Lab and LC Lab, respectively. Having explored various laboratories equipped with modern equipment, we are sure that the participants would have benefited from it and hope it would help them in carrying out their research work.



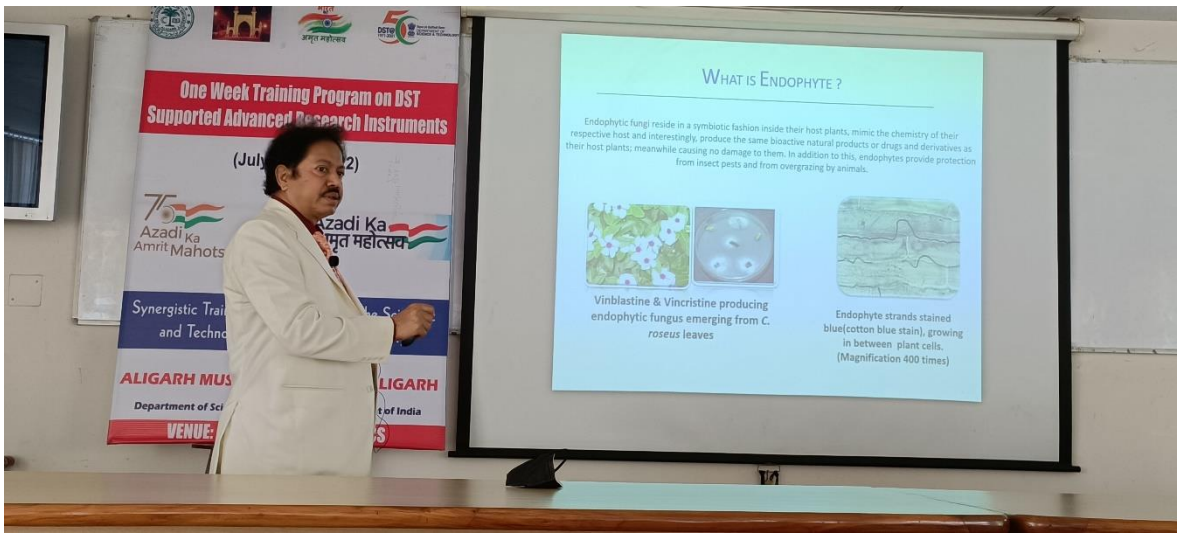
Participants attending the demonstrations at Nuclear Physics laboratory

The second day was also successfully conducted and the participants learned a lot of new things.

Participants attending the demonstrations at liquid crystal laboratory

Participating attending the demonstrations in XRD Laboratory during Hand on training

DAY 3



Prof. Absar Ahmad, Founder Director, INC, AMU Aligarh while presenting his talk

The first session of the third day started with the Scientific talk by Prof. Absar Ahmad, Founder Director, INC, AMU Aligarh on "Translational research on bio inspired nanomaterials & drugs from endophytes". In his talk, he discussed the biosynthesis of various nanomaterials along with versatile applications of the same in medical, industry etc.

The next talk of the day began in the second session where Dr. M. Wasi Khan delivered an enlightening lecture on "Transmission electron microscopy (TEM): A versatile tool for nanomaterials characterization". He discussed the widespread application of the microscopic technique, Transmission Electron Microscopy (TEM), for the complete characterization of nanomaterials and devices. He said that TEM plays a vital role in characterization of specimen in diverse areas such as physical and life sciences and provides information about material structure and chemical composition through the interaction of electrons with the specimen. In his lecture, he introduced some of the historical developments in TEM and covered instrumentation, sample preparation, imaging and analytical microscopy. In addition, he also highlighted some of the specific drawbacks or limitations of TEM and discussed the interpretation of TEM images which would be useful for the research work of the participants.

Dr. M. Wasi Khan, AMU Aligarh while presenting his talk on TEM

The third and fourth sessions were devoted to practical training of instruments in LC, CMP and NP laboratories. On the third day Group 1, 2 and 3 visited the LC, NP and CMP laboratory respectively.

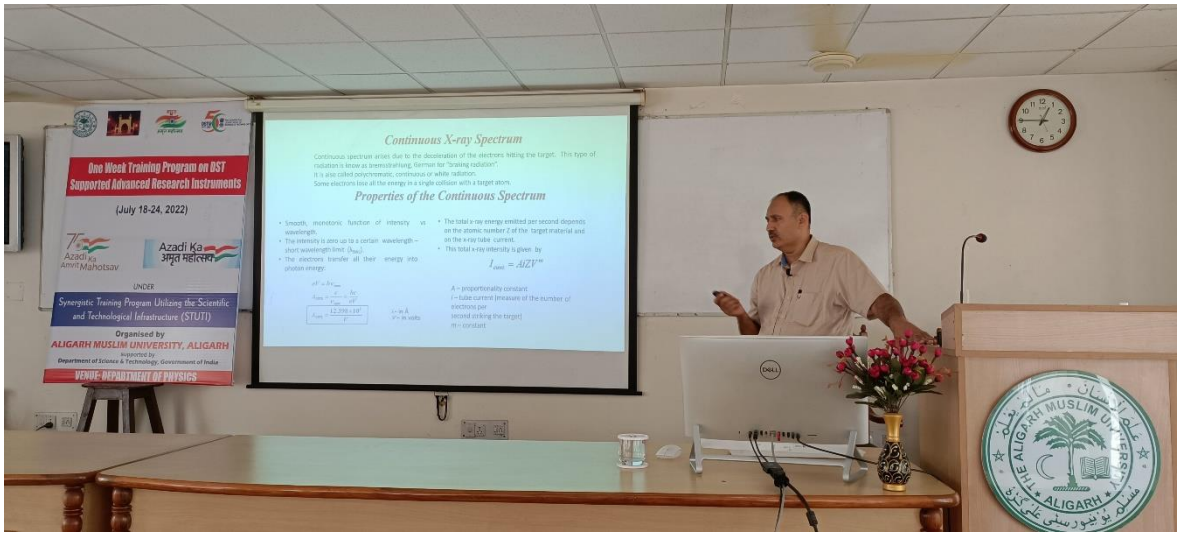
Participating attending the demonstrations in liquid crystal, nuclear physics and condensed matter physics laboratories during Hand on training session

DAY 4

On the fourth day, a very special visit has been planned for the participants, where Dr. M. Wasi Khan demonstrated various research facilities at University Sophisticated Instruments Facility (USIF), AMU, Aligarh. The objective of this lecture cum demonstration was to make participants apprised the various analytical methods in a straight forward way. He focused on the hands-on description of the most effective and widely used characterization techniques such as TEM, SEM, Raman spectroscopy, single crystal XRD, etc., available at he University Sophisticated Instruments Facility (USIF). He also provided participants with a basic understanding of sophisticated research tools.

Participants while visiting USIF, AMU, Aligarh

The second session began post tea break where Prof. Shahid Husain delivered a scientific lecture on "X-ray Diffraction: A Probe for Structural Analysis". He talked about the properties of X-ray diffraction and explained that X-ray diffraction is a versatile, non-destructive characterization technique that reveals detailed information about the chemical composition, crystallographic and microscopic structure of all types of natural and manufactured materials. He elaborated that X-rays can yield unique fingerprints of Bragg reflections associated with the crystal structure. He also discussed the crystal structure which can be thought of as a formation of layers, or planes, with each layer acting as a semi-transparent mirror. He stated that X-rays with a wavelength similar to the distances between these planes can be reflected such that the angle of reflection is equal to the angle of incidence and one can determine the lattice parameters, unit cell volume, crystallite size and micro-strain with the help of this technique.



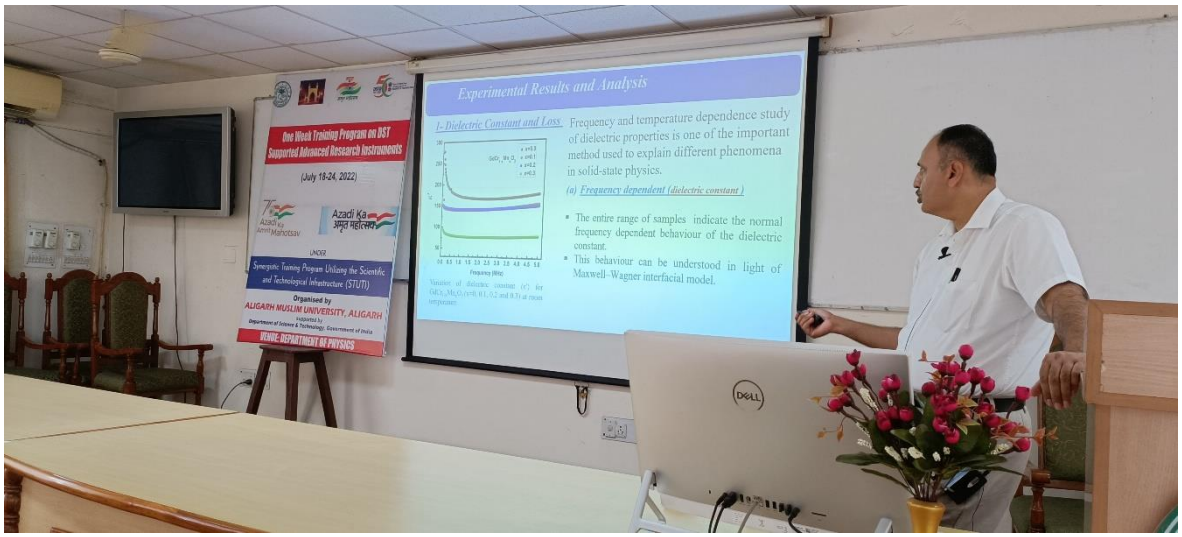
Prof. Shahid Husain, AMU Aligarh, while presenting his talk

The final session began after lunch where the students explored the research laboratories. Groups 1, 2 and 3 visited the CMP, LC and NP laboratories respectively on that day.

Participating attending the demonstrations at Polarizing Light Microscope during Hand on Training Session

DAY 5

The first scientific talk of the fifth day was given by Prof. Shahid Husain. He lectured on "Role of Dielectric Measurement in materials Characterization". In his talk, he discussed the importance of dielectric measurement in material characterization. He stated that measurement of the dielectric constant as a function of frequency and temperature provides information about the relaxation time and type of polarization and that the Curie–Weiss temperature can also be determined using dielectric constant data. He also discussed that AC conductivity is calculated with the help of data acquired using dielectric measurement and the frequency dependence of the AC conductivity data reveals the conduction mechanism while the temperature dependence of the same gives the activation energy. He provided a brief introduction to the Cole–Cole and Nyquist plots that furnish additional details about the material under study.



Prof. Shahid Husain, AMU Aligarh, while presenting his talk

The second session of the day began with a prominent lecture by Dr. Sudhir Kumar Gupta, Department of Physics, AMU on "The supersymmetric Universe". In his talk, he discussed symmetries, explaining that symmetries are the guiding principles behind theories governing the Universe in terms of a set of elementary particles and the fundamental forces. He shed light on facts related to unfolding the mysteries of nature by realising the symmetry between bosons and fermions together with other space-time symmetries.

Dr. Sudhir Kumar Gupta, AMU Aligarh, while presenting his talk

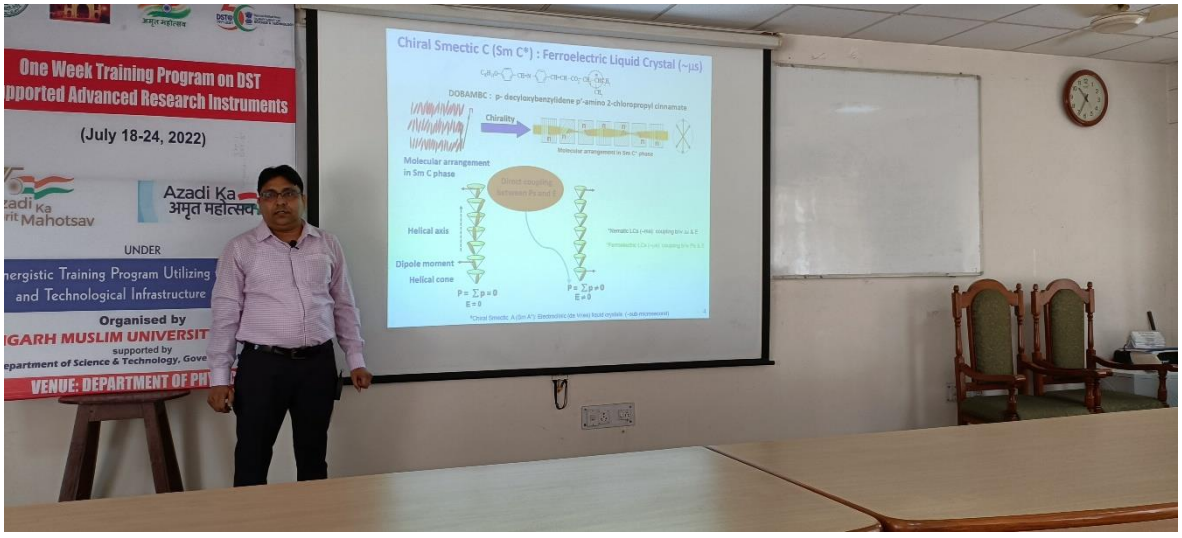
Post lunch, the third and fourth sessions began. Students were given the opportunity to visit NP, CMP and LC laboratories as per their choice and were encouraged to conduct experiments. Specifically, we focused on providing comprehensive information about various high-quality equipments to the participants and motivated them to make

maximum use of the facilities available in the department.

Herewith, the fifth day ended smoothly and it was a very well-organized day of the training program. The participants were pleased with the arrangement to allow them to visit the laboratory of their preference.

DAY 6

The sixth day of the program commensed with an invited lecture by Dr. Gautam Singh from Amity University, Noida. He delivered the lecture on "Liquid crystal nanoscience: Recent advances and future perspectives". In his lecture, he emphasized the importance of liquid crystal nanoscience in the field of liquid crystals. He focused on detailing nanoparticle doping and explained that nanoparticle doping could reduce threshold/saturation voltage & switching response time, increase the optical contrast, etc. of various types of liquid crystals. He also discussed the wide applications of nanoparticles doped liquid crystals like tunable lenses, gratings, optical filters, sensors etc. He concluded his lecture by discussing the future perspective of nanocomposites.



Dr. Gautam Singh, Amity University, while presenting his talk

The Second lecture of the day was delivered by Dr. Gautam Singh, Amity University, Noida on "Characterization tools for liquid crystals and their composites". He covered the lecture by detailing the properties of Liquid crystals (LCs) and their wide applications in ubiquitous liquid crystal displays (LCDs) and other electro-optical devices. In addition, he discussed various characterization tools such as cross-polarized optical microscope, differential scanning calorimeter, dielectric spectroscopy, electro-optics, X-ray scattering etc. Therefore, the basics of liquid crystals, sample cell

fabrication of various alignment conditions, use of characterization tools and data analysis were discussed in this talk. He advised that the use of these characterization tools could be extended to characterize the liquid crystal composites to understand and explore their basic and applied aspects.

Afterwards, the participants were then taken for a tour of the university campus. There the participants got the opportunity to explore the rich heritage of AMU. The participants visited the Musa Dakri Museum located in the AMU campus where they saw the ancient and medieval sculptures and archaeological antiquities located in the museum and were introduced to various aspects of Indian culture. Thereafter, the participants visited the Central Library of AMU, Maulana Azad Library, where they were introduced to the invaluable collection of manuscripts, rare books and artifacts. The students were introduced to the rich collection of 14 lakh volumes of books. There too participants were taken to the fascinating museum of Library where they were introduced to many valuable and informative ancient books and religious books that were originally written.

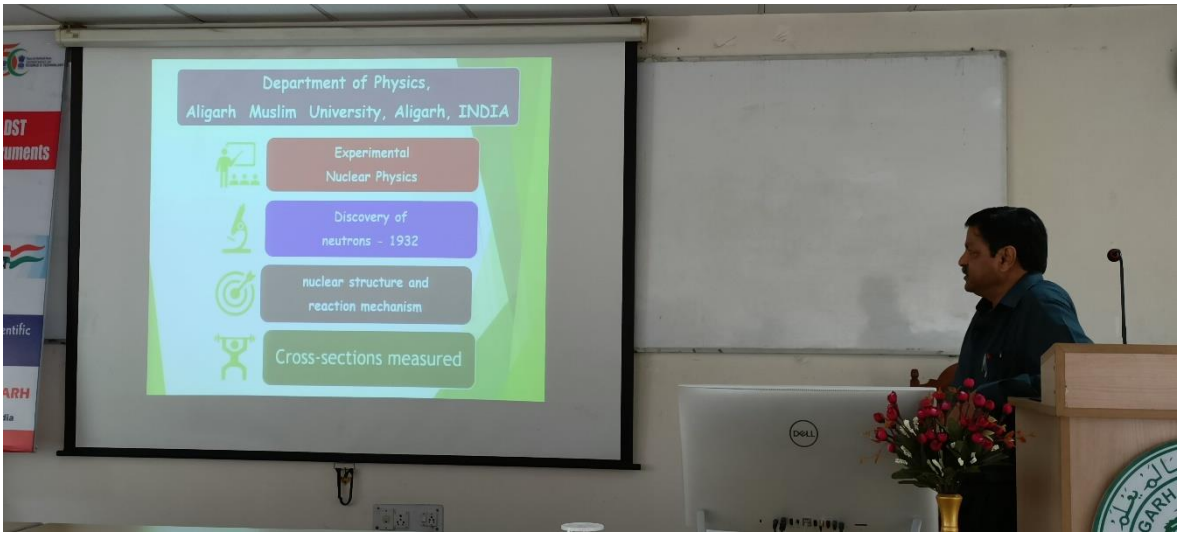
Participants while visiting University museum

Participants' group photo after University visit

Thus, the day ended with an informative and engaging tour. The participants were very happy with such a thrilling tour and with the arrangements and efforts made by the organizers to provide them a comfortable excursion. Hence the day was a complete success.

DAY 7

The first session of the concluding day started with a very illuminating talk by Prof. B.P. Singh, Chairman, Department of Physics, Aligarh Muslim University, Aligarh. He spoke on the topic "Basics of experimental study of nuclear reaction dynamics at low energies in light and heavy ion reactions". Prof. Singh explained in detail about the formation of compound nucleus. He briefly discussed some of the facts of Bohr's CN theory and pointed out that this was not sufficient to explain the experimental data for high-energy particle beams. He also discussed the formation and signatures of pre-equilibrium (PEQ) or pre-compound particles. In his speech he talked about the basic requirement to study nuclear reaction at low energies.



PMU Coordinator Prof. B. P. Singh while presenting his scientific talk

This was followed by the next session of the day, where the final lecture of the training program was delivered by Dr. S. S. Z. Ashraf on "Graphene: A Prototype Dirac Matter". In his lecture, Dr. Ashraf discussed the fact of how the low energy excitations are governed by Dirac equation in graphene and consider one illustration of it through the relativistic phenomena of Klein tunnelling in Graphene. He also illustrated that Graphene can be considered as a prototype material to study the Dirac quasi particle behavior in a condensed matter system. He beautifully described that a variety of novel phenomena observed in relativistic quantum mechanics can be translated directly into Dirac materials.

One of the participants while expressing his feedback

Prior the concluding session, participants shared their views and experiences during the

training program. All the participants were happy with the excellence of the training program and the quality of the content and subject matter of the lectures covered during the training. The students were very satisfied with the practical training provided to them by the faculty members and research scholars and appreciated the facilities provided to them for conducting experiments in the laboratories. Also, the participants appreciated the organization of the visit to the University. All the participants appreciated the efforts made by the organizing team to make their stay comfortable and provide them with all the necessary support. He was appreciative of all the team members extending all possible help and was grateful for organizing this event. Having received such remarks, we believe that the training was successful in serving its purpose. We are quite sure that the participants gained immense knowledge of the subjects covered and learned a lot from the practical training. We believe that the training provided to them during the program will help them in conducting their research and will boost their research career. It will be reflected in their research work.

VALEDICTORY SESSION

Valedictory Program [Sunday, July 24, 2022 @ 1:00 PM - 2:30 PM]	
Time (IST)	**Event**
01:00PM –01:15PM	Complete report of the Program by Dr. Jai Prakash, coordinator
01:00PM –01:15PM	Felicitation of Guests
01:15PM –01:30PM	Welcome Address by Prof. B. P. Singh, Chairman, Department of Physics, AMU
01:30PM –01:40PM	Address by Coordinator of the program, Dr. M. Wasi Khan
01:40PM –01:50PM	Feedback by Participants
01:50PM –02:15PM	Address by Chief Guest Prof. Qudsia Tehseen, Department of Zoology, AMU, Aligarh
02:15PM –02:25PM	Certificate Distribution by Hon'ble Guest
02:25PM –02:30PM	Vote of Thanks by Dr. Jai Prakash
02:30PM –	Lunch

"One Week Training Program on DST Supported Advanced Research Instruments" was organized by the Department of Physics, Aligarh Muslim University, Aligarh from July 18-24, 2022. The training program was sponsored by Department of Science &

Technology (DST) under Synergistic Training Program Utilizing the Scientific and Technological Infrastructure (STUTI).

The objective of conducting the training program was to disseminate maximum knowledge of the subject covered and to make the students comprehensive about the facilities and research tools available in the department. Specifically, the goal of the training program is to provide students with a comprehensive knowledge of research techniques and to train them in the equipments available in the department so that they can use them extensively in their research work.

PMU Coordinator Prof. B. P. Singh while presenting welcome address during concluding function

Concluding function

PMU Coordinator, Prof. B. P. Singh while presenting memento to Chief Guest, Prof. Qudsia Tahseen during concluding function

Chief Guest, Prof. Qudsia Tahseen while expressing her view during concluding function

The week-long training program ended on July 24, 2022. In the valedictory session the chief guest Prof. Qudsia Tehseen, Department of Zoology, Aligarh Muslim University graced the program with her presence. The session begins with a full report on the training program given by Dr. Jai Prakash. Where he elucidated complete information about the smooth running of the program starting from the first day to the concluding day. Thereafter, the head of the Physics Department of AMU, Prof. B. P. Singh took the stage and addressed the audience with his enlightening words. He narrated how the Physics Department of AMU received the STUTI project and explained to the students the importance of such training programs for them. He encouraged and motivated the students to participate in such training program in future as well. After that, the Chief guest Prof. Qudsia Tehseen delivered her powerful speech. Prof. Tehseen appreciated the department for organizing such an event and providing an opportunity to the students to explore various informative and enlightening things. She said that this would lead overall development of the students. She was mesmerized by the collection of students from different states of the country and regarded it as unity in diversity. In her lectures, she emphasized on quality research. She motivated the students to work hard for quality research instead of running for many publications. She also stressed upon the students to work for the ideas where the society can be benefited more as the aim of science is to help society. She urged to organize such events in the respective areas in future also. In her concluding remarks, she was blessed to attend the event and witness the glory of the program. She was delighted to meet the participants from different parts of the country and from different cultures.

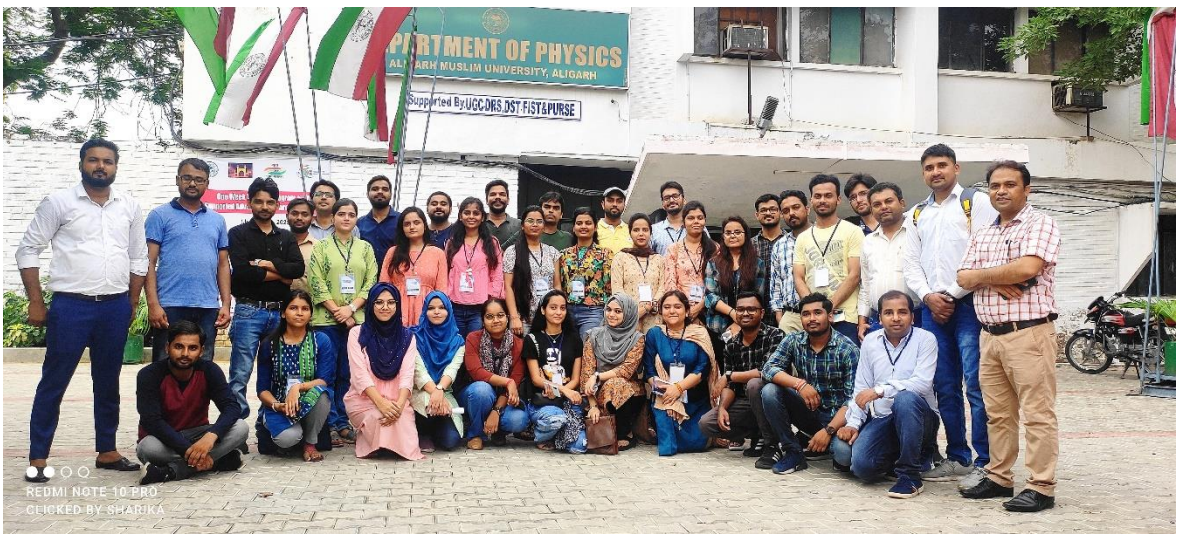
Concluding function

PMU Coordinator, Prof. B. P. Singh while presenting memento to Chief Guest, Prof. Qudsia Tahseen during concluding function

One of the participants receiving certificate and memento by Chief Guest, Prof. Qudsia Tahseen during concluding function

In the end, Dr. Jai Prakash, convener of the program presented his closing remarks and vote of thanks. He thanked the Chief Guest for accepting the invitation to attend the program. He thanked all the faculty members, training program members, research scholars and participants for their cooperation in making this event a huge success.

One of the participants receiving certificate and memento by Chief Guest, Prof. Qudsia Tahseen during concluding function



Group photograph

PLAN

After receiving overwhelmingly positive feedback from the participants, we are very motivated to organize more such events with more features in the near future. We are planning to organize an event in mid-October. There we will focus more on practical training as we believe that students learn more from experiments rather than theory, although there will be theoretical lectures as well.

ACKNOWLEDGEMENTS

We express our sincere gratitude to the Department of Science and Technology (DST) for sanctioning a project under Synergistic Training Program Utilizing the Scientific & Technological Infrastructure (STUTI) to the Department of Physics, Aligarh Muslim University, Aligarh. We thank Prof. Avinash C. Pandey, Director IUAC, New Delhi for accepting our invitation to attend the inaugural function as the Chief Guest and for making the event grand with his presence. We also thank Prof. Mohammad Gulrez, Pro Vice Chancellor, AMU Aligarh for taking some time out of his extremely busy schedule to be present at the inaugural function. We are grateful to the coordinators of the program, Prof. B. P. Singh, Chairperson, Physics Department, AMU, Dr. M. Wasi Khan and Dr. Jai Prakash for their efforts in making the program a smooth run and a huge success. We acknowledge the use of the Research Laboratories of the Department of Physics, AMU during the training. Also, we are thankful for the experimental facilities provided at USIF and the support of the staf there. We extend our special thanks to the researchers, volunteers and STUTI team members for their immense hard work and support to make this event a grand success. It is crucial to mention here that without their cooperation this program would not have been possible. Lastly, we would like to thank all the staff members of AMU, dear participants and all those who have supported in any way for the smooth conduct of the program.

OUTCOME

Participants from different parts of the country registered for the event and participated in it with great enthusiasm. The participants were from different streams of science like physics, chemistry, biology, nanotechnology, biochemistry etc. The participants were introduced to various experimental techniques and were provided with information

about various laboratories of the University, where they gained practical knowledge of various characterization techniques, synthesis etc., along with the practical training, the participants also learned a lot from the lectures on the chosen topic. Since the STUTI scheme envisions a hands-on training program and sensitization of the state-of-the-art equipment as well as towards sharing while ensuring transparent access of S&T facilities, we primarily focused on giving participants a comprehensive exposure to practical knowledge. This will boost their research career. The training encouraged the participants to conduct their research work effectively and qualitatively by providing them with information about the recent developments in the field of science and technology. So the training served its real purpose.

FEEDBACK

The program received positive response from the participants, as can be seen from the feedback form filled by them. All the participants expressed satisfaction and appreciated the training programme.

NEWS COVERAGE

1. https://www.amu.ac.in/news/2022/7/19/one-week-training-program-on-dst-supported-advanced-research-instruments

2.https://m.facebook.com/story.php?story_fbid=pfbid0YsukA9xBqpQrDoPcTRDva4rFHeUfeX6LsqLFHC3j5PfgRRvDdvhfr88YvMkmXcbel&id=164606300686618

THANK YOU.

With regards

(Prof. B. P. Singh) PMU, Coordinator

(Dr. M. Wasi Khan) Conveners

(Dr. Jai Prakash) Conveners