	(previously known as Thapar University)	
138.	The Institute of Science	MumbaI (Maharashtra)
139.	The National Academy of Sciences	Prayagraj (Uttar Pradesh)
140.	The National Centre for Polar and Ocean Research (formerly known as the National Centre for Antarctic and Ocean Research)	Vasco da Gama (Goa)
141.	UGC-DAE-Consortium For Scientific Research	Indore (Madhya Pradesh)
142.	UGC-DAE-Consortium For Scientific Research	Kolkata (West Bengal)
143.	UM-DAC Centre for Excellence in Basic Sciences	Mumbai (Maharashtra)
144.	UR Rao Satellite Centre (formerly known as ISRO Satellite Centre)	Bengaluru (Karnataka)
145.	Variable Energy Cyclotron Centre	Kolkata (West Bengal)
146.	Veer Bahadur Singh Purvanchal University (formerly Purvanchal University)	Jaunpur (Uttar Pradesh)
147.	Vellore Institute of Technology	Vellore (Tamil Nadu)
148.	Vidya Prasarak Mandal's Polytechnic	Thane (Maharashtra)
149.	Visva-Bharati	Santiniketan (West Bengal)
150.	Wadia Institute of Himalayan Geology	Dehradun (Uttarakhand)

6.2 विद्यार्थी कार्यक्रम

6.2.1 ऑनलाइन विज्ञान स्नातक (भौतिक विज्ञान) विद्यार्थी ग्रीष्मकालीन कार्यक्रम

आशीष शर्मा

विज्ञान स्नातक (भौतिक विज्ञान) ग्रीष्मकालीन कार्यक्रम–2021 का 01 से 30 जून के दौरान ऑनलाइन माध्यम से संचालन किया गया। इस हेतु ऑनलाइन माध्यम से प्राप्त कुल 383 आवेदनों में से देश के 21 अलग–अलग राज्यों का प्रतिनिधित्व करने वाले 21 विद्यार्थियों का चयन किया गया था। पैन इंडिया स्तर पर अंतर–विश्वविद्यालय त्वरक केंद्र की पहुँच और प्रसार में वृद्धि हो, इस उद्देश्य से इस वर्ष देश के प्रत्येक राज्य का प्रतिनिधित्व करने वाले विद्यार्थियों को चुना जाए, इस बात का विशेष रूप से ध्यान रखा गया। विद्यार्थियों ने केंद्र के वैज्ञानिक और अभियांत्रिक कर्मचारियों के कुशल मार्गदर्शन में त्वरक भौतिकी, भौतिक विज्ञान, नाभिकीय भौतिकी, भूकालक्रम विज्ञान और कृत्रिम बुद्धि के क्षेत्र में अत्याधुनिक शोध परियोजनाओं का प्रदर्शन किया।

मनोनीत किए गए शोध कार्य के अलावा, विद्यार्थियों के लिए विशेष संध्याकालीन व्याख्यानों से लाभान्वित कराया गया। ग्रीष्मकालीन कार्यक्रम के दौरान, अंतर–विश्वविद्यालय त्वरक केंद्र के वैज्ञानिकों द्वारा क्षेत्र विशेष से संबंधित व्याख्यान और देश के कुछ प्रख्यात विद्वानों के विज्ञान और समाजशास्त्र प्रसिद्ध व्याख्यान, ये दो प्रकार की विशेष व्याख्यान श्रृंखला आयोजित की गई।

एक माह के ग्रीष्मकालीन परियोजना कार्यक्रम के अंत में, विद्यार्थियों द्वारा प्रस्तुत प्रतिवेदन का मूल्यांकन करने के लिए केंद्र के वैज्ञानिकों की एक निर्णायक समिति का गठन किया गया था। इसके बाद विद्यार्थियों द्वारा प्रस्तुतियां दी गईं और उसके आधार पर सर्वश्रेष्ठ परियोजना कार्य के लिए एक विद्यार्थी का चयन किया गया। सभी विद्यार्थियों को एक माह का परियोजना कार्य सफलतापूर्वक पूर्ण करने पर सहभागिता प्रमाण पत्र प्रदान किया गया।

6.2.2 विज्ञान स्नातकोत्तर अभिमुखता कार्यक्रम

आर. मेहता

अंतर– विश्वविद्यालय त्वरक केंद्र इच्छुक विद्यार्थियों को अपने ज्ञान के पूरक के लिए प्रोत्साहित करने और उन्हें विज्ञान में अपना के करियर जारी रखने की दिशा में प्रेरित करने हेतु विज्ञान स्नातकोत्तर अभिमुखता कार्यक्रम आयोजित करता है। इस कार्यक्रम की परिकल्पना चयनित विज्ञान स्नातकोत्तर विद्यार्थियों को त्वरकध्आयन पुंज आधारित शोध से संबद्ध क्षेत्रों में लघु परियोजनाओं के माध्यम से व्यावहारिक प्रशिक्षण प्रदान करना है। विज्ञान स्नातकोत्तर अभिमुखता कार्यक्रम की अवधि तीन सप्ताह होती है। यह पूरे वर्ष खुला रहता है। विद्यार्थी अपने सुविधाजनक समयानुसार पर कार्यक्रम के लिए आवेदन कर सकते हैं। इस लचीलेपन के कारण विद्यार्थी अपने मुख्य अध्ययन कार्यक्रम में कोई व्यवधान डाले बिना ही परियोजना की अवधि चुन सकते हैं। आवेदन केवल ऑनलाइन प्रस्तुत किए जा सकते हैं।

6.2.3 विद्यावाचस्पति (पीएचडी) शिक्षण कार्यक्रम

एस. मुरलीथर और ए. त्रिपाठी

अंतर–विश्वविद्यालय त्वरक केंद्र ऊर्जावान आयन बीम का उपयोग करके अनुसंधान करने वाले पीएच.डी. अध्येयताओं के लिए विश्वविद्यालय अनुदान आयोग के दिशानिर्देशों के अनुरूप सोलह क्रेडिट पाठ्यक्रम का संचालन करता है। गत शैक्षणिक वर्ष के दौरान केंद्र एवं अन्य विश्वविद्यालयों के अनुसंधानकर्ताओं और केंद्र के नए प्रशिक्षु वैज्ञानिकों के लिए दो सत्रीय पीएच.डी. कार्यक्रम का संचालन किया जा रहा था। इस कार्यक्रम को विभिन्न विश्वविद्यालयों से संबंधित अनुसंधानकर्ताओं से उत्कृष्ट प्रतिक्रिया प्राप्त हो रही है। अगस्त–दिसंबर के दौरान आयोजित प्रथम सत्र में उन्नत भौतिकी, त्वरक भौतिकी और प्रायोगिक भौतिकी के पाठ्यक्रम चलाए जाते हैं, और जनवरी–मई के दौरान आयोजित द्वितीय सत्र में उन्नत संघनित पदार्थ भौतिकी, उन्नत नाभिकीय भौतिकी, संगणकीय तकनीक, और अनुसंधान प्रविधि के पाठ्यक्रम चलाए जाते हैं । अनुसंधान प्रविधि को छोड़कर सभी पाठ्यक्रम तीन–तीन क्रेडिट अंक के हैं। अनुसंधान प्रविधि के पाठ्यक्रम में चार क्रेडिट पॉइंट्स का संगणकीय तकनीक पाठ्यक्रम शामिल है।

कोरोना महामारी के कारण शैक्षणिक वर्ष 2021–22 के प्रथम सत्र (दिसंबर 2021 से मार्च 2022) के संचालन में विलंब हुआ। द्वितीय सत्र अप्रैल 2022 से जुलाई 2022 तक की अवधि का है। केंद्र के विद्यार्थियों, विश्वविद्यालयों के शोधार्थियों के लिए आयोजित पाठ्यक्रम संसाधनों की परिमितता के कारण ऑनलाइन माध्यम से संचालित किए जाते हैं। पाठ्यक्रम में परिचर्या करने हेतु विज्ञान में स्नातकोत्तर (भौतिक विज्ञान) होना आवश्यक न्यूनतम योग्यता है। सत्रीय कार्यध्संगोष्ठी और पाठ्यक्रम के अंत में एक परीक्षा के आधार पर विषय में अध्येयताओं के प्रदर्शन का मूल्यांकन किया जाता है।

इस वर्ष सुश्री हिमांशी गुप्ता, श्री. सौरभ कुमार शर्मा तथा श्री विपुल जोशी इन तीन अध्येयताओं नें पीएचडी शोध–प्रबंध मौखिकी परीक्षा सफलतापूर्वक पूर्ण की है।

6.2.4 शिक्षण प्रयोगशाला के कार्यकलाप

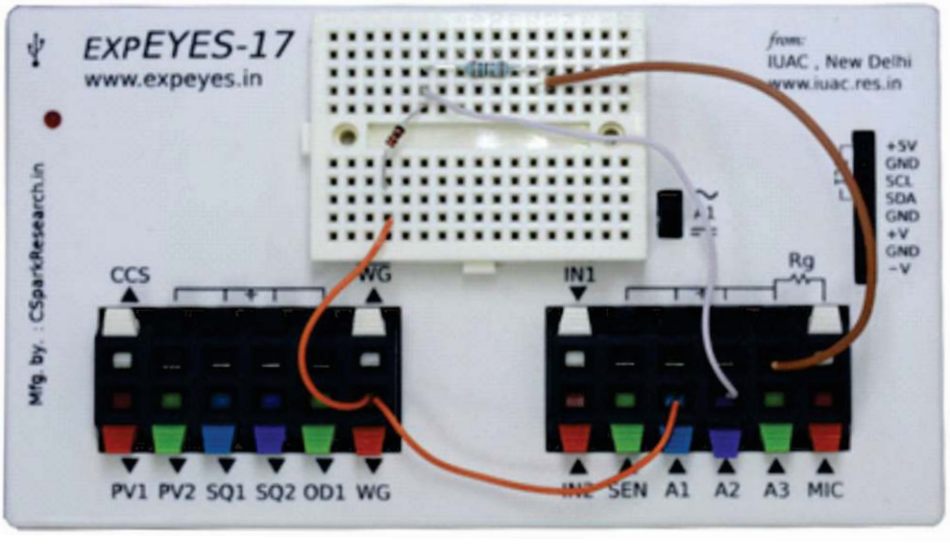
वी.वी.वी. सत्यनारायण

शिक्षण प्रयोगशाला की स्थापना वर्ष 2005 में अंतर–विश्वविद्यालय त्वरक केंद्र के आउटरीच कार्यक्रम के एक भाग के रूप में की गई थी, जो मुख्यतः कंप्यूटर इंटरफेस द्वारा जुड़े प्रयोगशाला उपकरणों और प्रशिक्षण महाविद्यालयधविश्वविद्यालय के शिक्षकों का विकास करती है। इस योजना के अंतर्गत विकसित किए गए हार्डवेयर और सॉफ्टवेयर ओपन सोर्स हैं। एक्सपाइस–17 हार्डवेयर का उपयोग कंप्यूटर इंटरफेस द्वारा जुड़े विज्ञान के प्रयोगों पर प्रशिक्षण प्रदान करने के लिए किया जाता है। एक्सपाइस (युवा अभियंताओं एवं वैज्ञानिकों के लिए प्रयोग) एक ऐसा उपकरण है, जो एक साधारण कंप्यूटर को प्रयोगशाला उपकरणों के समूह यथा ऑसिलोस्कोप, फंक्शन जनरेटर, आवृत्ति गणक, डीसी विद्युत प्रदायी, थर्मामीटर, दाबमापी आदि के संग्रह में परिवर्तित कर सकता है। इन कार्यों को एक ग्राफिकल यूजर इंटरफेस के माध्यम से नियंत्रित होने वाले एक्सपाइस के शीर्ष पर एनालॉग और डिजिटल इनपुटध्आउटपुट टर्मिनलों के एक सेट पर उपलब्ध कराया गया है।

दिनांक 20 जुलाई से 07 अगस्त 2021 तक विज्ञान अकादमी, चेन्नई और भौतिकी विभाग और नैनो विज्ञान और प्रौद्योगिकी विभाग, भारथिअर विश्वविद्यालय, कोयंबटूर द्वारा ऑनलाइन माध्यम से भौतिकी में ग्रीष्मकालीन प्रशिक्षण कार्यक्रम – 2021 में '' एक्सपाइस... योर लैब / होम'' विषय पर दो आमंत्रित व्याख्याताओं के व्याख्यान आयोजित किए गए। हिमाचल प्रदेश केंद्रीय विश्वविद्यालय, धर्मशाला में 'पर्सन' के लिए जागरूकता कार्यक्रम में कार्यक्रम की प्रस्तावना के बाद एक्सपाइस इंटरफेस का प्रदर्शन किया गया।

अंवित्व केंद्र शिक्षा प्रबंधन प्रणाली शिक्षकों को एक्सपाइस, अभ्यासियों के लिए मैसेज पासिंग इंटरफेस प्रोग्रामिंग, मूडल लर्निंग मैनेजमेंट सिस्टम आदि पर ऑनलाइन पाठ्यक्रम बनाने में सक्षम बना रहा है, जिसका वेब पता इस प्रकार है– https://gate.iuac.res.in/moodle/

चित्र 1. एक्सपाइस –17



6.2 STUDENT PROGRAMME

6.2.1 Online B.Sc. (Physics) Students Summer Programme

Ashish Sharma

B.Sc. Summer Programme-2021 was conducted in online mode during June 01-30. A total of 21 students representing 21 different states of the country were selected out of the total 383 applications received online. This year special care was taken to shortlist candidates representing each state of the country thereby increasing the outreach and footprint of IUAC at pan India level. The students performed cutting-edge research projects in the fields of Accelerator Physics, Materials Science, Nuclear Physics, Geochronology and Artificial Intelligence, under the able guidance of Scientific and Engineering staff of IUAC.

In addition to the designated research work, the students were exposed to an enriching series of special evening lectures. Two types of special lecture series were organized during the summer programme, viz; domain specific lectures from the Scientists of IUAC and popular level lectures in science and sociology from a few of the Eminent Personalities of the country.

At the end of one-month summer project programme, a jury committee consisting of scientists of IUAC was formed to evaluate the reports submitted by the students. This was followed by the presentations of the students and based on that, one student was selected for the best project work. All the students received a certificate of participation after successful completion of their one month project work.

6.2.2 M.Sc. Orientation Programme

R Mehta

Inter-University Accelerator Centre (IUAC) conducts M.Sc. Orientation Programme to encourage interested students to supplement their knowledge and to motivate them to continue their career in science. This programme has been envisaged to provide hands-on training in fields associated with accelerator / ion beam based research to selected M.Sc. students by way of short projects. The duration of the programme is three weeks. It is open throughout the year. Students can apply for this program based on their convenient time. This flexibility allows the students to choose the project period without hampering their main study course. Applications can be submitted online only.

6.2.3 PhD Teaching Programme

S. Muralithar and A. Tripathi

IUAC conducts a sixteen credit course work, conforming to UGC guidelines for PhD students pursuing research using energetic ion beams. The two semester Ph.D programme for research students of IUAC, research students from other universities and new trainee scientists of IUAC, continued during the past academic year. The programme has been receiving excellent response from students belonging to different universities. The first semester, held during August - December, offers courses in Advanced Physics, Accelerator Physics, and Experimental Physics, while the second semester, held during January - May, offers courses in Advanced Condensed Matter Physics, Advanced Nuclear Physics, Computational Techniques, and Research Methodology. All courses, except Research methodology are of three credit points each. The course on Research methodology, includes the course on Computational techniques, is a four credit point course.

The first semester of the academic year 2021 -22 was delayed (December 2021 to March 2022) due to the pandemic. The second semester is from April 2022 to July 2022. The courses are conducted for research students of IUAC, research scholars from universities and in online mode due to resource constraints. The minimum qualification required to attend the course work is M.Sc. (Physics). Performance of scholars in the subject is evaluated based on assignments / seminars and an examination at the end of the course.

Three candidates have successfully defended their PhD thesis viva voce examination this year. Ms Himanshi Gupta, Mr Saurabh Kumar Sharma and Mr Vipul Joshi.

6.2.4 TEACHING LAB ACTIVITIES

V.V.V. Satyanarayana

The Teaching Lab was established in 2005 as a part of IUAC as outreach program, mainly develops computer interfaced laboratory equipment and training college/university teachers. The hardware and software developed under this project are open sourced. Exp EYES-17 hardware is used for providing training on computer interfaced science experiments. Exp EYES (Experiments for Young Engineers and Scientists) can be considered as a device that can convert an ordinary computer to a collection of laboratory equipment like oscilloscope, function generator, frequency counter, DC power supply, thermometer, pressure gauge, etc. These functions are made available on a set of analog and digital input/output terminals on the top side of ExpEYES controlled through a Graphical User Interface. Introduction to Python programming and open source operating systems is a part of the training programme.

Two invited talks on the topic of "**Exp EYES…Your Lab@Home**" were given in Summer Training Program in Physics – 2021 organized by **Academy of Sciences**, **Chennai** and the Department of Physics and Department of Nanoscience and Technology, **Bharathiar University, Coimbatore** held during 20th July to 7th August 2021 in on-line mode. Introductory talk followed by the demonstration of ExpEYES interface is delivered in awareness program for PERSON at Central University of Himachal Pradesh, Dharamshala.

IUAC Learning Management System is enabling teachers to create on-line courses on ExpEYES, Message Passing Interface programming for beginners, Moodle Learning Management System, etc., and its web address is https://gate.iuac.res.in/moodle/

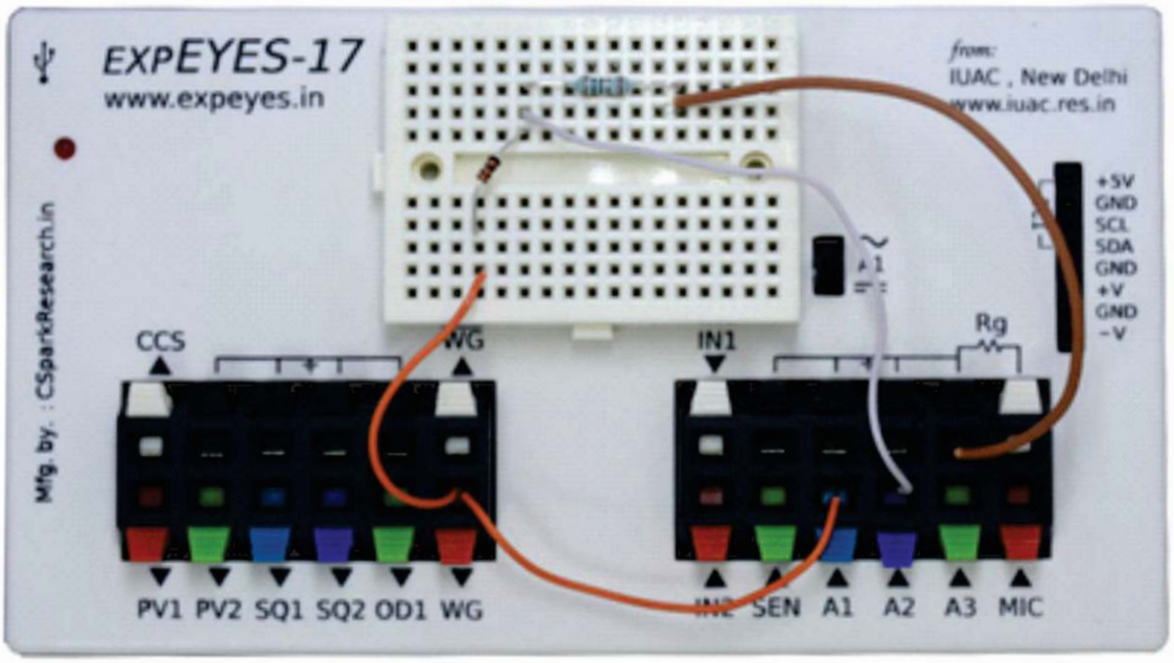


Figure 1. ExpEYES-17

6.3 LIBRARY

Priyambada Nayak

Salient features

Working hours:	Round the clock, all days of the week
Total Books:	~2930 (broadly covering the subjects Nuclear Physics, Materials Science, Nanotechnology, Electronics, Computer Science, Radio-biology, Radiation Physics, Vacuum Instrumentation, Cryogenics, Atomic Physics, Mathematical Physics, Quantum Mechanics, Astrophysics etc.
Current E-Journals:	> 2500
Bound Journals:	~8500
Laboratory Reports:	~900 (from nearly 50 labs)
Newsletters, House magazines etc.	50
Databooks, Manuals etc.:	~550
Ph.D. Thesis:	180
Clientele:	Apart from IUAC staff and students, the library is consulted by students, teaching and research staff from over 100 academic and research institutions in different parts of the country.

The technical reports and technicals memos of various projects carried out at IUAC are also compiled and kept in the library for reference purpose. Web-based OPAC and library cataloging software package "KOHA" has been used for the computerization of library documents. Apart from the current online journals, Journal archives (AIP, IOP, APS, ACS, Science Direct, Springer, Science, Nature, IEEE) are also being subscribed by the library. **"Turn-it-in" and "URKUND"**, the originality check softwares are being used to prevent plagiarism. **"Web of Science"** is being subscribed by the library and used by the scholars for citation analysis and other purposes. The library is a member of eSS Consortium and more than 2500 journals are being accessed on-line through these facilities. The library is open round the clock. Hence, automatic monitoring system has been installed.

6.4 ACADEMIC ACTIVITIES HELD IN 2021-2022

April

7 **Acquaintance Prog. on Geochronology facility at IUAC**
(Contact persons: Mr. S Ojha, Dr. Pankaj Kumar.)

8- 9 **IUAC School on Materials Science at Sikkim University, Gangtok**
(Contact Persons: Dr. A. Tripathi and Prof. S. Mukhopadhyay)

May

3 - 8 **Training Programme on Computer Interfaced Science Experiments**
(Contact Persons: Dr Kundan Singh, Mr. VVV Satyanarayana)

June

1 - 26 **Summer Programme for B.Sc. (Physics) Students**
(Contact Persons: Dr. Sarvesh Kumar, Mr. Ashish Sharma, Mr. Sanjay Kedia)

2 - 3 **Advanced workshop on In-Silico Quantum Modelling Studies**
(Contact Persons: Dr S. Mookerjee and Dr S.A. Khan)

9 - 11 **School on AMS and HR-SIMS**
(Contact persons: Dr. Pankaj Kumar, Mr. S. Ojha)

23-24 **Workshop on Utilization of THz radiation in the field of Materials Science.** (Contact Persons: Dr. Ambuj Tripathi, Dr. Subhendu Ghosh)

25 **Workshop on Utilization of THz radiation in the field of Biological Science.**
(Contact Person: Dr. Asitikantha Sarma, Dr. Ambuj Tripathi, Dr. Subhendu Ghosh)

	28-29	**Workshop on INGA Recent results and future perspectives** (Contact Persons: Dr. R.P. Singh, Mr. Yashraj)
July		
	5 - 7	**Users' Workshop** (Contact person: Dr. S. Chopra)
	8	**70th AUC Meeting**
	27 - 28	**Workshop on Artificial Intelligence,Machine learning and computational intelligence** (Contact Persons: Dr. J. Antony and Dr B.K. Sahu)
August		
	10 - 11	**JRF/SRF/RA Six Monthly Presentations** (Contact Person: Dr. A Tripathi)
		PhD Program: (Contact Person: Dr. S. Muralithar)
	25	**JNU/IUAC Academic Committee Meeting** (Contact Person: Dr. S. Muralithar)
	17 - 20	**4th National School on Heavy ion radiation biology** (Contact person: Dr. A. Sarma)
	23 - 24	**Workshop on "Physics studies with recoil separators"** (Contact Persons: Dr. N. Madhavan, Dr. S. Nath, Dr. J. Gehlot)
September		
	7 - 8	**Workshop on ion beam induced sensors** (Contact persons: Dr. V.V. Sivakumar, Dr. I. Sulania)
	20 - 24	**School on Nuclear structure using gamma ray spectroscopy** (Contact Persons: Dr. R.P. Singh and Dr. R. Kumar)
		Lectures on Beam Instrumentation by Dr.Rahul Singh and Dr.Peter Forck, GSI (As part of the VAJRA faculty scheme, SERB) (Contact Persons: Dr. G.O. Rodrigues)
October		
	4 - 9	**Workshop on 'Teaching lab'** (Contact persons: Mr. V.V.V. Satyanarayana, Dr. Kundan Singh)
	5 - 8	**International Conference on Nanostructuring with Ion Beams** at Bhubaneswar (Co-organised with IOP / IIT / NISER) (Contact person: Dr. A.Tripathi)
	25 - 30	**School on Detector Simulation** (Contact person: Dr. P Sugathan)
November		
	2 - 3	**Workshop on "Frontier of research with magnetically confined plasma and future perspectives"** **(**Contact persons: Dr. G.O. Rodrigues, Dr. Pravin Kumar)
	9 – 12	**School on Microscopic Characterization Techniques (TEM/SEM/AFM)** (Contact persons: Dr. D. Kabiraj, Dr. S.A. Khan)
	15 – 20	**School on Nuclear reactions** Contact Persons: Dr. S. Nath, Dr. K.S. Golda
	17 – 18	**Atomic-Molecular Physics Workshop** (Contact persons: Mr. Deepak Swami and Dr. C.P. Safvan)
	23 - 25	**Chronological systematics and their applications in Earth Sciences** (Contact persons: Mr. S Ojha, Dr Pankaj Kumar, Dr. S. Chopra)

Pelletron Preventive Maintenance

December

16 - 18 **Users' Workshop**
(Contact person: Dr. S. Chopra)

19 **Foundation Day Programme & 71st AUC Meeting**

January

Ph.D Program: Semester
(Contact Person: Dr. S. Muralither)

February

8 **Acquaintance Programme at Mumbai University**
(Contact Persons: Mr. S. Ojha, Dr. S. Chopra)

16 - 18 **Academic Group presentations**
(Contact Persons: Dr. S. Ghosh)

23 **Orientation Programme for Research Scholars on HIRA and HYRA usage**
(Contact Persons: Dr. N. Madhavan, Dr. S. Nath & Dr. J. Gehlot)

24 – 25 **Workshop on "Physics with Recoil Separators"**
(Contact Persons: Dr. Jagdish Gehlot and Ms. Gonika)

28 **National Science Day**
(Contact Person: Mr. Abhishek Rai)

March

9 – 10 **Presentations on AY/FY 2020-21 and plans for AY/FY 2021-22**
(Contact Person: Dr. N. Madhavan)

6.5 FORTHCOMING EVENTS : 2022

April

19 - 21 **Workshop on Geochronology**
(Contact persons: Dr. Pankaj Kumar, Mr. S. Ojha. Dr. S. Chopra)

June

4 - 29 **Summer Programme for B.Sc. (Physics) Students**
(Contact Persons: Mr. Ashish Sharma, Mr. Sanjay Kedia)

July

4 - 7 **Users Workshop: Users Presentations for Beam Time Proposals**
(Contact Person: Mr. R. Mehta)

8 **72nd AUC Meeting**

August

3 - 4 **Indigenous Developments of RF Power Sources/Amplifiers for Accelerators**
(Contact person: Mr. S. Venkataramanan)

10 **Acquaintance Programme at Manipur University**
(Contact Persons: Dr. Pankaj Kumar, Dr. S. Chopra)

Ph.D Program: Semester
(Contact Person: Dr. S. Muralithar)

16 – 17 **Recent Developments in Plasma Based Ion Sources for Accelerators and Associated Physics Programme**
(Contact Persons: Dr. Pravin Kumar, Dr. G. Rodrigues)

September

13 – 15	**Workshop on Ion Beams in energy conversion devices** (Contact Persons: Dr. F. Singh, Dr. V.V. Sivakumar)
20 – 21	**Workshop on NAND experiments: present status and future developments** (Contact Person: Mrs. K.S. Golda)
23	**Workshop on Recent Developments in Beam Diagnostics** (Contact Person: Dr. R.V. Hariwal)

October

	SC Linac Campaign
11 – 12	**Workshop on Geochronology** (Contact Person: Dr. Pankaj Kumar, Mr. S. Ojha, Dr. S. Chopra)
13	**Acquaintance Programme at Gurukul Kangri Vishwavidyalaya, Haridwar** (Contact Person: Dr. Pravin Kumar)
27 - 28	**Workshop on Physics with Trapped Charged Particles (WPTCP-22)** (Contact Person: Dr. Sugam Kumar, Mr. Deepak Swami)

November

1 – 8	**Advanced Workshop on In Sillico Quantum Modelling Studies** (Contact Persons: Dr. S.A. Khan, Mr. A. Kumar)
10 – 14	**School on Ion beams in Materials Science** (Contact Persons: Dr. A.Tripathi, Mr. R.C. Meena)
16 – 19	**7th International Conference on Ion Beams in Materials Engineering and Characterization (7-IBMEC)** (Contact Persons: Dr. A. Tripathi, Mr. S. Kedia)
22 – 25	**School Cum Workshop on Detectors and Allied Instrumentation for Accelerator Based Physics Experiments** (Contact Person: Dr. Akhil Jhingan)

December

	Pelletron Preventive Maintenance
15 – 18	**Users Workshop: Users Presentations for Beam Time Proposals** (Contact Person: Mr. R. Mehta)
19	**33rd Foundation Day Programme and 73rd AUC Meeting**

6.6 LIST OF Ph.D AWARDEE

The following scholars have completed their Ph.D thesis work during 2021-22.

Vipul Joshi: Generation of 'Comb' Electron beam and production of Electromagnetic Radiation from the beam.

Saurabh Kumar Sharma: Radiation induced effects in the nano-structured pyrochlore for waste form applications.

Himanshi Gupta: Spectroscopy and electrical transport studies of doped metal oxide in nanophases tailored under ion irradiation.

6.7 LIST OF PUBLICATIONS IN THE YEAR 2021-22

A NUCLEAR PHYSICS

1. **Evolution of nuclear structure through isomerism in 216Fr,** Madhu, Khamosh Yadav, A. Y. Deo, Pragati, P. C. Srivastava, S. K. Tandel, S. G. Wahid, S. Kumar, S. Muralithar, R. P. Singh, Indu Bala, S. S. Bhattacharjee, Ritika Garg, S. Chakraborty, S. Rai and A. K. Jain, Phys. Rev. C 105, 034308 (2022).

2. **Level structure in the transitional nucleus 215Fr,** Khamosh Yadav, A. Y. Deo, Madhu, Pragati, P. C. Srivastava, S. K. Tandel, S. G. Wahid, S. Kumar, S. Muralithar, R. P. Singh, Indu Bala, S. S. Bhattacharjee, Ritika Garg, S. Chakraborty, S. Rai and A. K. Jain, Phys. Rev. C 105, 034307 (2022).

3. **Role of the entrance channel in the experimental study of incomplete fusion of 13C with 93Nb,** Avinash Agarwal, Anuj Kumar Jashwal, Munish Kumar, S. Prajapati, Sunil Dutt, Muntazir Gull, I. A. Rizvi, Kamal Kumar, Sabir Ali, Abhishek Yadav, R. Kumar and A. K. Chaubey, Phys. Rev. C 105, 034609 (2022).

4. **Systematic study of fusion suppression for tightly bound projectiles at above-barrier energies,** M. Shariq Asnain, Mohd. Shuaib, Ishfaq Majeed, Manoj Kumar Sharma, Vijay R. Sharma, Abhishek Yadav, Devendra P. Singh, Pushpendra P. Singh, Sushil Kumar, R. Kumar, B. P. Singh and R. Prasad, Phys. Rev. C 105, 014609 (2022).

5. **Shape coexistence and octupole correlations in 72Se,** A. Mukherjee, S. Bhattacharya, T. Trivedi, R. P. Singh, S. Muralithar, D. Negi, R. Palit, S. Nag, S. Rajbanshi, M. Kumar Raju, S. Kumar, D. Choudhury, R. Kumar, R. K. Bhowmik, S. C. Pancholi and A. K. Jain, Phys. Rev. C 105, 014322 (2022).

6. **Inference on fission timescale from neutron multiplicity measurement in 18O+184W,** N. K. Rai, A. Gandhi, M. T. Senthil Kannan, S. K. Roy, N. Saneesh, M. Kumar, G. Kaur, D. Arora, K. S. Golda, A. Jhingan, P. Sugathan, T. K. Ghosh, Jhilam Sadhukhan, B. K. Nayak, Nabendu K. Deb, Saumyajit Biswas, A. Chakraborty, A. Parihari and Ajay Kumar, J. Phys. G: Nucl. Part. Phys. 49 035103 (2022).

7. **Exploring breakup coupling effect in 7Li+92,100Mo elastic scattering around Coulomb barrier energies,** C. Joshi, H. Kumawat, R. K. Singh, N. L. Singh, D. Patel, B. K. Nayak, J. Acharya, A. Parihari, K. Rani, S. D. Sharma, G. Kaur, I. Ahmed, K. S. Golda, N. Saneesh, M. Kumar, A. Jhingan and P. Sugathan, Eur. Phys. J. A 57, 40 (2022).

8. **Measurements of evaporation residue cross-sections for 48Ti +140,142Ce reactions,** D. P. Kaur, B. R. Behera, N. Madhavan, S. Nath, J. Gehlot, A. Kaur, Raghav, Gonika, R. Biswas, Subodh, Amit, A. Parihari, K. Rani, H. Arora, Shruti and S. Pal, Nucl. Phys. A 1019, 122384 (2022).

9. **Shape coexistence in proton rich Se isotopes,** A. Mukherjee, S. Bhattacharya, T. Trivedi, R. P. Singh, S. Muralithar, D. Negi, R. Palit, S. Nag, S. Rajbanshi, S. Kumar, M. Kumar Raju, D. Choudhury, S. Sihotra, R. Kumar, S.C. Pancholi and A.K. Jain, Bulg. J. Phys. 49, 108 (2022).

10. **An IoT compliant control system for automation of liquid nitrogen filling of clover Ge detectors at IUAC, New Delhi,** Rajendra Nath Dutt, R. Ruby Santhi, Yashraj, R. K. Gurjar, S. K. Saini, H. Rana, R. P. Singh, S. Muralithar, IFAC PapersOnLine 55-1, 884 (2022).

11. **Observation of multiphonon transverse wobbling in 133Ba,** K. Rojeeta Devi, Suresh Kumar, Naveen Kumar, Neelam, F. S. Babra, Md. S. R. Laskar, S. Biswas, S. Saha, P. Singh, S. Samanta, S. Das, S. Chakraborty, R. P. Singh, S. Muralithar and A. Kumar, Phys. Lett. B 823, 136756 (2021).

12. **Transition probabilities in 31P and 31S: A test for isospin symmetry,** D. Tonev, G. de Angelis, I. Deloncle, N. Goutev, G. De Gregorio, P. Pavlov, I. L. Pantaleev, S. Iliev, M. S. Yavahchova, P. G. Bizzeti, A. Demerdjiev, D. T. Dimitrov, E. Farnea, A. Gadea, E. Geleva, C. Y. He, H. Laftchiev, S. M. Lenzi, S. Lunardi, N. Marginean, R. Menegazzo, D. R. Napoli, F. Nowacki, R. Orlandi, H. Penttila, F. Recchia, E. Sahin, R. P. Singh, M. Stoyanova, C. A. Ur and H.-F. Wirth, Phys. Lett. B 821, 136603 (2021).

13. **Fusion studies in 16O+142,150Nd reactions at energies near the Coulomb barrier,** A. C. Visakh, E. Prasad, P. V. Laveen, M. Shareef, A. Shamlath, S. Nath, N. Madhavan, J. Gehlot, Gonika, Rohan Biswas, A. Parihari, J. Khuyagbaatar, B. Lommel, B. Kindler, A. M. Vinodkumar, B. R. S. Babu, S. Sanila, K. M. Varier and S. Appannababu, Phys. Rev. C 104, 054602 (2021).

14. **Collective and noncollective states in 66Zn,** Indu Bala, S. C. Pancholi, M. K. Raju, A. Dhal, S. Saha, J. Sethi, T. Trivedi, R. Raut, S. S. Ghugre, R. Palit, R. P. Singh and S. Muralithar, Phys. Rev. C 104, 044302 (2021).

15. **Effect of NON-CLUSTER projectile on incomplete-fusion dynamics: Experimental study of the 14N +181Ta,** M. S. Asnain, M. Shuaib, I. Majeed, M. K. Sharma, V. R. Sharma, A. Yadav, D. P. Singh, P. P. Singh, U. Gupta, R. N. Sahoo, A. Sood, M. Kaushik, S. Kumar, R. Kumar, B. P. Singh and R. Prasad, Phys. Rev. C 104, 034616 (2021).

16. **Analysis of mass-separated evaporation residues formed in 32S+70,68Zn fusion reactions: The special case of 97,95Ru,** Deepak Kumar, Moumita Maiti, Rinku Prajapat, Amit Chauhan, Rohan Biswas, J. Gehlot, S. Nath, R. Kumar, N. Madhavan, G. Naga Jyothi, Rudra N. Sahoo, Md Moin Shaikh and Vishal Srivastava, Phys. Rev. C 104, 014602 (2021).

17. **Measurement of fission excitation function for 19F+194,196,198Pt reactions,** V. Singh, B. R. Behera, M. Kaur, A. Jhingan, R. Kaur, P. Sugathan, D. Siwal, S. Goyal, K. P. Singh, S. Pal, A. Saxena, S. Kailas, J. Phys. G: Nucl. Part. Phys. 48, 075104 (2021).

18. **Antimagnetic rotation and role of gradual neutron alignment in 103Pd,** A. Y. Deo, Khamosh Yadav, Madhu, S. K. Tandel and R. Kumar, Eur. Phys. J. A 57, 126 (2021).

19. **Systematic study of fusion-fission events in 19F+175Lu interactions at low energies,** Ishfaq Majeed Bhat, Mohd. Shuaib, M. Shariq Asnain, Vijay R. Sharma, Abhishek Yadav, Manoj Kumar Sharma, Pushpendra P. Singh, Devendra P. Singh, R. Kumar, R. P. Singh, S. Muralithar, B. P. Singh and R. Prasad, Nucl. Phys. A 1014, 122236 (2021).

20. **A note on the parity of I = 5- state in 126,128Xe,** S. Chakraborty, H. P. Sharma, S. S. Tiwary, C. Majumder, A. K. Gupta, P. Banerjee, S. Ganguly, S. Rai, Pragati, Mayank, S. Kumar, S. S. Bhattacharjee, R. P. Singh, S. Muralithar, A. Kumar and R. Palit, Int. J. Mod. Phys. E 30, 2150085 (2021).

21. **Ground state and excited state multinucleon transfer channels in interactions of 28Si with 90,94Zr in near barrier region,** S. Kalkal, S. Mandal, N. Madhavan, A. Jhingan, S. Nath, E. Prasad, R. Sandal, S. Goyal, M. Saxena, G. Mohanto, S. Verma, B. R. Behera, S. Kumar, U. Datta, A. K. Sinha, R. Singh, S. Noor, Int. J. Mod. Phys. E 30, 2150053 (2021).

22. **Octupole correlations in 127I,** S. Chakraborty, H. P. Sharma, S. S. Tiwary, C. Majumder, A. K. Gupta, A. Kumar, P. Banerjee, S. Ganguly, S. Kumar, A. Kumar, R. P. Singh and S. Muralithar, Int. J. Mod. Phys. E 30, 2150030 (2021).

23. **Evaluation of detection efficiency and neutron scattering in NAND detector array: FLUKA simulation and experimental validation,** N. Saneesh, Divya Arora, A. Chatterjee, K. S. Golda, Mohit Kumar, A. M. Vinodkumar and P. Sugathan, Nucl. Instrum. Methods A 1013, 165682 (2021).

B. MATERIALS SCIENCE

1. Low Energy Argon Ion Irradiation Effect on Magnetic Behavior Of Polycrystalline Cu Substituted ZnO, Shreenu Pattanaik, Jyoshnarani Mohapatra , Dilip Kumar Mishra, Pravin Kumar, and D. Kanjilal, *Materials Today: Proceedings*, Volume 35 (2), 2021, Pages 79-81.
2. Structural studies of zirconia and yttria doped zirconia for analysing its phase stabilization criteria, Ankit Kumar, Pravin Kumar, A S Dhaliwal, *IOP Conf. Ser.: Mater. Sci. Eng.* 1033 (2021) 012052.
3. Tuning the optical and electrical properties of magnetron-sputtered Cu-ZnO thin films using low energy Ar ion irradiation, S K Singh, Puneeta Tripathi, I Sulania, VV Siva Kumar, Pravin Kumar, *Optical Materials*, 114 (2021) 110985.
4. Probing pure and mixed neon ECR plasma - An effort for understanding the mechanism of isotope anomaly and gas mixing effect, Puneeta Tripathi, Shushant Kumar Singh, Pravin Kumar, *Phys. Plasmas.* 28, 033508 (2021); doi: 10.1063/5.0041206.
5. Structural and Optical Modifications of RF-Sputtered ZnO Thin Films Using Low Energy Ar Ion Irradiation, S K Singh, VV Siva Kumar and Pravin Kumar, *Appl. Phys. A* 127, 524 (2021)
6. Site disorder and its tailoring in N implanted post-annealed ZnO: Prospects and problems, Apu Mondal, S. Pal, Suvadip Masanta, Sourabh Pal, Rajib Saha, Pravin Kumar, A. Singha, S. Chattopadhyay, D. Jana, A. Sarkar, *Materials Science in Semiconductor Processing,* 135 (2021) 106068
7. Synthesis and rietveld refinement study of calcium doped zirconia, Ankit Kumar, Pravin Kumar and A. S. Dhaliwal, AIP Conference Proceedings, 2352, 020042 (2021); https://doi.org/10.1063/5.0052559
8. Structural and surface morphological studies of WSe_2 2-D material, Karan Bansal, Pravin Kumar and A. S. Dhaliwal, AIP Conference Proceedings 2352, 020065 (2021); https://doi.org/10.1063/5.0052724