

6. ACADEMIC ACTIVITIES

6.1 BEAM UTILIZATION BY USERS

6.1.1 LEIBF (Positive & Negative Ion) Beam Time Utilization and Experiments performed (April, 2019 to March, 2020)

Users	No. of Shifts used (1 Shift =8Hrs.)	Project in	
		Materials Science	Atomic Physics
A. Universities/Colleges			
Amity University, Noida	9	2	
Guru Ghasidas Vishwavidyalaya, Bilaspur	3	1	
Gurukul Kangri University, Haridwar	6	1	
Indira Gandhi University, Haryana	16	4	1
ITM University, Gurgaon	6	1	
Jawaharlal Nehru University, Delhi	4	1	
Kolkatta University	3	1	
Kurukshetra University, Kurukshetra	9	2	
MNIT, Jaipur	12	2	
Shivaji University, Kolhapur	6	1	
University of Delhi, New Delhi	6		1
University of Mumbai, Mumbai	3	1	
B. Institutions			
Indian Institute of Technology New Delhi	3	1	
Indian Institute of Technology Jodhpur	3	1	
Indian Institute of Technology Hyderabad, Madras	2	1	
Inter-University Accelerator Centre, New Delhi	24	6	1
Malaviya National Institute of Technology Jaipur, Jaipur	6	2	
Manav Rachna University, Faridabad	2	1	
Tata Insittitue of Fundamental Research, Hyderabad	4		1
RRCAT, Indore	12	1	
NISER, Odisha	6	1	
NPL, New Delhi	12	1	
Shiv Nadar University, G.Noida	4	1	
SSPL, DRDO, DELHI	1	1	
Facility Test			
TOTAL	162	34	4

6.1.2 Pelletron Beam Time Utilization and Experiments performed (April, 2018 to March, 2019)

Users	No. of Shifts Used (1 Shift= 8 Hrs.)	Project in				
		Nuclear Physics	Materials Science	Radiation Biology	Atomic Physics	AMS
A. Universities/Colleges						
Aligarh Muslim University, Aligarh	3		1			
Amity University, Noida	12		3			
Bareilly College, Bareilly	15	1				
Birbal Sahni Institute of Palaeosciences, Lucknow	33					3
Calicut University, Kerala	30	1				
Deccan College Post-Graduate and Research Institute, Pune	7					1
Delhi Technological University, Delhi	14					1
Devi Ahilya Vishwavidyalaya, Indore	3		1			
Goa University, Plateau	34					2
Govt College, Faridabad	3		1			
Guru Ghasidas Vishwavidyalaya, Bilaspur	15	2				
Guru Gobind Singh Indraprastha University, Delhi	5		2			
HNBG University, Garhwal	3+14 (samples)		1			1
Jawaharlal Nehru University, Delhi	2		1			
Karnataka University, Dharwad	15	1				
Kurukshetra University, Kurukshetra	20	1				
Pondicherry University, Pondicherry	30					2
MRI University, Faridabad	3+3		1			
M S University, Baroda	3		1			
Panjab University, Chandigarh	123	3				
Periyar University, Salem	7					1
University of Delhi, New Delhi	12+30 (samples)	2				1
University of Kalyani, Kalyani	3			3		
University of Pune	4		1	1		
University of Kashmir, Srinagar	6					1
S S Jain Subodh (PG) College, Jaipur	3		3			
Wadia Insitutte of Himalayan Geology, Dehradun	7					1
B. Institutions						
Archaeological Survey of India, Aizawal	7					1
Archaeological Survey of India, Nagpur	7					1
Archaeological Survey of India, Delhi	21					2
Archaeological Survey of India, Odisha	8					1
Birbal Sahni Institute of Palaeobotany, Lucknow	20					1
Institute of Seismological Research	1					1
Indian Instiute of Technology, Guwahai, Assam	7					1
Indian Institute of Kanpur, Kanpur	26					2

Users	No. of Shifts Used (1 Shift= 8 Hrs.)	Project in				
		Nuclear Physics	Materials Science	Radiation Biology	Atomic Physics	AMS
Indian Institute of Technology Kharagpur, Kharagpur	50					1
Indian Institute of Technology, Ropar, Panjab	3		1			
Indian Institute of Technology Roorkee, Roorkee	3+30		1			1
Indian Institute of Bombay, Mumbai	15	1				
Indian Institute of Technology, Delhi	3		1			
Inter-University Accelerator Centre, New Delhi	32+20 (samples)	2	5			1
INMAS, DRDO, Delhi	1			1		
ISRO, Bangalore	6	1				
IISER, Kolkata, Nadia	14					1
NIAS, Bangaluru	21					1
VIT, Jaipur	3		1			

6.1.3 List of Users Family

The following list includes Universities/Colleges/Institutions that have used the IUAC Pelletron facility (once or more) since 1991.

UNIVERSITIES – (135)

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| 1. Acharya Nagarjuna University | Guntur (Andhra Pradesh) |
| 2. Alagappa University | Karaikudi (Tamil Nadu) |
| 3. Aligarh Muslim University | Aligarh (Uttar Pradesh) |
| 4. Amity University | Noida (Uttar Pradesh) |
| 5. Andhra University | Visakhapatnam (Andhra Pradesh) |
| 6. Anna University | Chennai (Tamil Nadu) |
| 7. Assam University | Silchar (Assam) |
| 8. Babasaheb Bhimrao Ambedkar University | Lucknow (Uttar Pradesh) |
| 9. Banaras Hindu University, Varanasi (formerly Central Hindu College) | Varanasi (Uttar Pradesh) |
| 10. Bangalore University | Bangalore (Karnataka) |
| 11. Berhampur University | Berhampur (Odisha) |
| 12. Bharathiar University | Coimbatore (Tamil Nadu) |
| 13. Bharathidasan University | Tiruchirappalli (Tamil Nadu) |
| 14. Central University of Haryana | Mahendragarh (Haryana) |
| 15. Central University of Jammu | Jammu (Jammu and Kashmir) |
| 16. Central University of Jharkhand | Ranchi (Jharkhand) |
| 17. Central University of Kerala | Kasaragod (Kerala) |
| 18. Central University of Punjab | Bathinda (Punjab) |
| 19. Central University of Rajasthan | Ajmer (Rajasthan) |
| 20. Central University of South Bihar | Gaya (Bihar) |
| 21. Chaudhary Charan Singh University, Meerut (formerly Meerut University) | Meerut (Uttar Pradesh) |

22.	Chaudhary Devi Lal University	Sirsa (Haryana)
23.	Chitkara University	Solan (Himachal Pradesh)
24.	Cochin University of Science & Technology	Kochi (Kerala) C)
25.	Darmstadt University of Technology	Darmstadt (Germany)
26.	Deenbandhu Chhotu Ram University Of Science And Technology (formerly Chhotu Ram State College of Engineering)	Murthal (Haryana)
27.	Delhi Technological University (formerly Delhi College of Engineering)	Delhi
28.	Devi Ahilya Vishwavidyalaya	Indore (Madhya Pradesh)
29.	Dr. Babasaheb Ambedkar Marathwada University	Aurangabad (Maharashtra)
30.	Dr. Bhimrao Ambedkar University (formerly Agra University)	Agra (Uttar Pradesh)
31.	Doon University	Dehradun (Uttarakhand)
32.	Deen Dayal Upadhyaya Gorakhpur University	Gorakhpur
33.	Gauhati University	Guwahati (Assam)
34.	Gautam Buddha University	Greater Noida (Uttar Pradesh)
35.	Goa University	Plateau (Goa)
36.	Govind Ballabh Pant University of Agriculture and Technology	Pantnagar (Uttarakhand)
37.	Gujarat Technological University	Ahmedabad (Gujarat)
38.	Gujarat University	Ahmedabad (Gujarat)
39.	Gulbarga University	Gulbarga (Karnataka)
40.	Guru Ghasidas Vishwavidyalaya	Bilaspur (Chhattisgarh)
41.	Guru Gobind Singh Indraprastha University (formerly Indraprastha University)	Delhi (Delhi)
42.	Guru Jambheshwar University of Science & Technology	Hisar (Haryana)
43.	Guru Nanak Dev University	Amritsar (Punjab)
44.	Hemwati Nandan Bahuguna Garhwal University	Srinagar (Uttarakhand)
45.	Himachal Pradesh University	Shimla (Himachal Pradesh)
46.	Indira Gandhi National Open University	New Delhi (Delhi)
47.	Indira Gandhi University Meerpur	Meerpur (Haryana)
48.	I.K. Gujral Punjab Technical University (formerly Punjab Technical University)	Kapurthala (Punjab)
49.	Jai Prakash Vishwavidyalaya	Chhapra (Bihar)
50.	Jamia Millia Islamia University	New Delhi (Delhi)
51.	Jawaharlal Nehru University	Delhi (Delhi)
52.	JC Bose University of Science & Technology	YMCA Faridabad
53.	Karnataka University	Dharwad (Karnataka)
54.	Kiel University	Kiel (Germany)
55.	Kolhan University	Chaibasa (Jharkhand)
56.	Kurukshetra University	Kurukshetra (Haryana)
57.	Kuvempu University, Shankaraghatta	Shimoga (Karnataka)
58.	Kyoto University	Kyoto (Japan)
59.	K.R. Mangalam University	Gurgaon (Haryana)

60.	Ludwig-Maximilians-Universität München	Munich (Germany)
61.	Madurai Kamaraj University	Madurai (Tamil Nadu)
62.	Maharaja Krishnakumarsinhji Bhavnagar University (formerly Bhavnagar University)	Bhavnagar (Gujarat)
63.	Maharshi Dayanand University	Rohtak (Haryana)
64.	Maharishi Markandeshwar University	Mullana (Haryana)
65.	Mahatma Gandhi University	Kottayam (Kerala)
66.	Mahatma Jyotiba Phule Rohilkhand University	Bareilly (Uttar Pradesh)
67.	Manav Rachna International Institute of Research and Studies (formerly Manav Rachna International University)	Faridabad (Haryana)
68.	Mangalore University	Mangaluru (Karnataka)
69.	Manipur University	Imphal (Manipur)
70.	Manonmaniam Sundaranar University	Tirunelveli (Tamil Nadu)
71.	Marwadi University	Rajkot (Gujarat)
72.	Mohanlal Sukhadia University (also called University of Udaipur)	Udaipur (Rajasthan)
73.	Nirma University	Ahmedabad (Gujarat)
74.	North Carolina State University	Raleigh (USA)
75.	North-Eastern Hill University	Shillong (Meghalaya)
76.	North Maharashtra University (renamed as Kavayitri Bahinabai Chaudhari North Maharashtra University)	Jalgaon (Maharashtra)
77.	North Orissa University	Baripada (Odisha)
78.	Odisha University of Agriculture and Technology	Bhubaneswar (Odisha)
79.	Osaka University	Osaka (Japan)
80.	Osmania University	Hyderabad (Telangana)
81.	Panjab University	Chandigarh (Punjab)
82.	Patna University	Patna (Bihar)
83.	Periyar University	Salem (Tamil Nadu)
84.	Pondicherry University	Pondicherry (Pondicherry)
85.	Punjab Agricultural University	Ludhiana (Punjab)
86.	Punjabi University	Patiala (Punjab)
87.	Rani Durgavati Vishwavidyalaya (also known as University of Jabalpur)	Jabalpur (Madhya Pradesh)
88.	Rashtrasant Tukadoji Maharaj Nagpur University (formerly Nagpur University)	Nagpur (Maharashtra)
89.	Ravenshaw University	Cuttack (Odisha)
90.	Sabancı University	Tuzla/İstanbul (Turkey)
91.	Saint Petersburg Polytechnic University	Russia (Russia)
92.	Saurashtra University	Rajkot (Gujarat)
93.	Savitribai Phule Pune University (formerly University of Pune)	Pune (Maharashtra)
94.	Sharda University	Greater Noida (Uttar Pradesh)
95.	Sheffield Hallam University	Sheffield (UK)
96.	Shiv Nadar University	Greater Noida (Uttar Pradesh)
97.	Shivaji University	Kolhapur (Maharashtra)

98.	Shri Mata Vaishno Devi University	Katra (Jammu and Kashmir)
99.	Sikkim University	Gangtok (Sikkim)
100.	Sri Krishnadevaraya University	Anantapur (Andhra Pradesh)
101.	Swansea University	
102.	Tamil University	Thanjavur (Tamil Nadu)
103.	Tezpur University	Tezpur (Assam)
104.	The Maharaja Sayajirao University of Baroda	Vadodara (Gujarat)
105.	The NorthCap University, (formerly ITM University)	Gurgaon (Haryana)
106.	The University of Burdwan	Bardhaman (West Bengal)
107.	The University of Sheffield	Sheffield (UK)
108.	The University of Johannesburg	South Africa
109.	Tilka Manjhi Bhagalpur University (formerly Bhagalpur University)	Bhagalpur (Bihar)
110.	Tripura University	Suryamaninagar (Tripura)
111.	Tumkur University	Tumkur (Karnataka)
112.	University and Petroleum & Energy Studies	Dehradun (Uttarakhand)
113.	University of Allahabad	Prayagraj (Uttar Pradesh)
114.	University of Calcutta	Kolkata (West Bengal)
115.	University of Calicut	Kerala (Kerala)
116.	University of Delhi	New Delhi (Delhi)
117.	University of Hyderabad	Hyderabad (Telangana)
118.	University of Kalyani	Kalyani (West Bengal)
119.	University of Kashmir	Srinagar (Jammu and Kashmir)
120.	University of Lucknow	Lucknow (Uttar Pradesh)
121.	University of Madras	Chennai (Tamil Nadu)
122.	University of Maryland	Maryland (USA)
123.	University of Mumbai (known earlier as University of Bombay)	Mumbai (Maharashtra)
124.	University of Mysore	Mysuru (Karnataka)
125.	University of Notre Dame	Notre Dame (USA)
126.	University of Padova	Padova (Italy)
127.	University of Rajasthan	Jaipur (Rajasthan)
128.	University of Stuttgart	Stuttgart (Germany)
129.	University of Surrey	Guildford (UK)
130.	Heavy Ion Laboratory, University of Warsaw	Poland (Poland)
131.	Utkal University (also known as Vani Vihar)	Bhubaneswar (Odisha)
132.	Vikram University	Ujjain (Madhya Pradesh)
133.	Visva-Bharati University	Bolpur (West Bengal)
134.	Visvesvaraya Technological University	Belgaum (Karnataka)
135.	Maulana Abul Kalam Azad University of Technology (formerly West Bengal University of Technology)	Kolkata (West Bengal)

COLLEGES – (79)

1.	Aligarh College of Engineering and Technology	Aligarh (Uttar Pradesh)
2.	Anand International College of Engineering	Jaipur (Rajasthan)
3.	Ananda Mohan College	Kolkata (West Bengal)
4.	Armed Forces Medical College	Pune (Maharashtra)
5.	Bareilly College	Bareilly (Uttar Pradesh)
6.	Beant College of Engineering & Technology	Gurdaspur (Punjab)
7.	Bharatiya Jain Sanghatana's Arts, Science and Commerce College	Pune (Maharashtra)
8.	Bhiwandi College	Mumbai (Maharashtra)
9.	Birla College of Arts, Science and Commerce	Kalyan (Maharashtra)
10.	B.N.N. College	Bhiwandi (Maharashtra)
11.	Deen Dayal Upadhyaya College	New Delhi (Delhi)
12.	Doodhsakhar Mahavidyalaya	Kolhapur (Maharashtra)
13.	Dum Dum Motijheel College	South Dum Dum (West Bengal)
14.	D.A.V. College	Amritsar (Punjab)
15.	D.A.V. College	Jalandhar (Punjab)
16.	D.A.V. College	Kanpur (Uttar Pradesh)
17.	D.A.V. College	Mumbai (Maharashtra)
18.	D.B.S. (P.G.) College	Dehradun (Uttarakhand)
19.	Ewing Christian College	Prayagraj (Uttar Pradesh)
20.	Gandhi Faiz-E-Aam College	Shahjahanpur (Uttar Pradesh)
21.	Goalpara College	Assam (Assam)
22.	Government Arts College	Rajahmundry (Andhra Pradesh)
23.	Government College	Ajmer (Rajasthan)
24.	Government College	Kota (Rajasthan)
25.	Government College	Mahendragarh (Haryana)
26.	Guru Nanak Girls College	Ludhiana (Punjab)
27.	Gurudas College	Kolkata (West Bengal)
28.	Govt. V.Y.T.P.G Auto. College	Durg
29.	Iswar Chandra Vidyasagar College (formerly Belonia College)	Belonia (Tripura)
30.	Jai Hind College	Mumbai (Maharashtra)
31.	Kalindi College	New Delhi (Delhi)
32.	Kandi Raj College	Kandi (West Bengal)
33.	Kanya Mahavidyalaya	Jalandhar (Punjab)
34.	Kishinchand Chellaram College	Mumbai (Maharashtra)
35.	Kongunadu Arts & Science College	Coimbatore (Tamil Nadu)
36.	Koshi College	Khagaria (Bihar)
37.	Krishnath College	Baharampur (West Bengal)
38.	K.J. Somaiya College of Science & Commerce	Mumbai (Maharashtra)
39.	KLE's B.K. Degree College, Chikodi	Karnataka
40.	K.S.R College of Arts and Science for Women	

41.	Lalbaba College	Howrah (West Bengal)
42.	Maharajah's Post Graduate College	Vizianagaram (Andhra Pradesh)
43.	Maharani Shri Jaya College	Bharatpur (Rajasthan)
44.	Mahila Vidyalaya PG College	Lucknow (Uttar Pradesh)
45.	Marwari College	Ranchi (Jharkhand)
46.	M.M.H. College	Ghaziabad (Uttar Pradesh)
47.	Nayagarh College	Nayagarh (Odisha)
48.	Nizam College	Hyderabad (Telangana)
49.	N.S.A.M. College	Mangaluru (Karnataka)
50.	Poornaprajna College and Post Graduate Centre, Udupi	Udupi (Karnataka)
51.	Punjab Engineering College	Chandigarh (Chandigarh)
52.	P.C Jabin Science Govt College	Hubballi
53.	Raja Balwant Singh College (formerly known as Balwant Rajput College)	Agra (Uttar Pradesh)
54.	R.D. & D.J. College	Munger (Bihar)
55.	R.P.G. College	Ratnagiri (Maharashtra)
56.	Sanatan Dharma College	Ambala Cantt (Haryana)
57.	School of Physical Sciences	Nanded (Maharashtra)
58.	School of Physical Sciences	New Delhi (Delhi)
59.	School of Technology & Applied Sciences	Kochi (Kerala)
60.	Sharnbasveshwar College of Science	Gulbarga (Karnataka)
61.	Shri Varshney College	Aligarh (Uttar Pradesh)
62.	Smt. Chandibai Himathmal Mansukhani College	Thane (Maharashtra)
63.	Sree Narayana College	Kollam (Kerala)
64.	Sri Bhuvanendra College	Karkala (Karnataka)
65.	Sri S. Ramasamy Naidu Memorial College	Sattur (Tamil Nadu)
66.	Sri Venkateswara College	New Delhi (Delhi)
67.	St. Edmund's College	Shillong (Meghalaya)
68.	St. Xavier's College	Kolkata (West Bengal)
69.	St. Xavier's College	Mumbai (Maharashtra)
70.	Swami Shraddhanand College	New Delhi (Delhi)
71.	S.D.M. College	Mysuru (Karnataka)
72.	S.D.M. College	Ujire (Karnataka)
73.	S.S. Jain Subodh P.G. (Autonomous) College	Jaipur (Rajasthan)
74.	University College of Engineering (a constituent College of Anna University)	Arni (Tamil Nadu)
75.	University College of Science & Technology	Kolkata (West Bengal)
76.	Vaish College of Education	Rohtak (Haryana)
77.	Vardhaman College	Bijnor (Uttar Pradesh)
78.	Zakir Husain Delhi College	Delhi (New Delhi)
79.	Zamorin's Guruvayurappan College	Kerala

OTHER INSTITUTIONS – (125)

1.	All India Council For Technical Education	New Delhi (Delhi)
2.	All India Institute of Medical Sciences	New Delhi (Delhi)
3.	Amity Institute of Nanotechnology	Noida (Uttar Pradesh)
4.	Amity School of Engineering & Technology	New Delhi (Delhi)
5.	Amrita School of Engineering (Amrita School of Engineering is an engineering institution, part of Amrita Vishwa Vidyapeetham)	Bangaluru (Karnataka)
6.	Amrita Vishwa Vidyapeetham,	Bangaluru (Karnataka)
7.	Archaeological Survey of India	Agra (Uttar Pradesh)
8.	Archaeological Survey of India	Bhubaneswar (Odisha)
9.	Archaeological Survey of India	Janpath (Delhi)
10.	Archaeological Survey of India	Patna (Bihar)
11.	Archaeological Survey of India	Red Fort Complex (Delhi)
12.	Archaeological Survey of India	Vadodara (Gujarat)
13.	Atal Bihari Vajpayee Indian Institute of Information Technology and Management	Gwalior (Madhya Pradesh)
14.	AFM/XPS Laboratory	Bhubaneswar (Odisha)
15.	Agharkar Research Institute	
16.	Bangabasi Morning College	Kolkata (West Bengal)
17.	Bhabha Atomic Research Centre	Mumbai (Maharashtra)
18.	Birbal Sahni Institute of Palaeobotany	Lucknow (Uttar Pradesh)
19.	Birla Institute of Technology	Mesra (Jharkhand)
20.	Bose Institute	Kolkata (West Bengal)
21.	Bhilai Institute of Technology	Raipur
22.	Calcutta Institute of Engineering and Management	Kolkata (West Bengal)
23.	Central Electronics Engineering Research Institute	Pilani (Rajasthan)
24.	Centre for Cellular and Molecular Biology	Hyderabad (Telangana)
25.	Centre de Sciences Nucléaires et de Sciences de la Matière	France
26.	Centre for Superconductivity Research	USA
27.	CSIR-Institute of Minerals and Materials Technology (Formerly Regional Research Laboratory)	Bhubaneswar (Odisha)
28.	CSIR – National Institute of Oceanography, Goa	Goa
29.	Dayalbagh Educational Institute	Agra (Uttar Pradesh)
30.	Deccan College Post-Graduate and Research Institute	Pune (Maharashtra)
31.	Defence Laboratory	Jodhpur (Rajasthan)
32.	Defence Metallurgical Research Laboratory	Hyderabad (Telangana)
33.	Defence Research & Development Organization	Dehradun (Uttarakhand)
34.	Dr. B.R. Ambedkar National Institute of Technology (formerly Regional Engineering College Jalandhar)	Jalandhar (Punjab)
35.	Flerov Laboratory of Nuclear Reactions JINR	Russia
36.	Genetic Institute of Manufacturing Technology	Singapore (Singapore)
37.	GSI Helmholtzzentrum für Schwerionenforschung GmbH	Darmstadt (Germany)
38.	G.J.U.S & T, HISAR	Haryana
39.	Harcourt Butler Technological Institute	Kanpur (Uttar Pradesh)
40.	Homi Bhabha National Institute	Kolkata (West Bengal)
41.	HIL- Warsaw & IUAC – New Delhi	New Delhi

42.	Indian Association for the Cultivation of Science	Kolkata (West Bengal)
43.	Indian Institute of Engineering Science and Technology (Formerly Bengal Engineering and Science University, Shibpur)	Howrah (West Bengal)
44.	Indian Institute of Information Technology	Allahabad (Uttar Pradesh)
45.	Indian Institute of Information Technology Design & Manufacturing Jabalpur	Jabalpur, Madhya PradeshJabalpur
46.	Indian Institute of Science	Bengaluru (Karnataka)
47.	Indian Institute of Science Education and Research Kolkata	Mohanpur (West Bengal)
48.	Indian Institute of Science Education and Research Mohali	Mohali (Punjab)
49.	Indian Institute of Space Science and Technology	Valiamala (Kerala)
50.	Indian Institute of Technology Gandhinagar	Gandhinagar (Gujarat)
51.	Indian Institute of Technology Jodhpur	Jodhpur (Rajasthan)
52.	Indian Institute of Technology Kanpur	Kanpur (Uttar Pradesh)
53.	Indian Institute of Technology Kharagpur	Kharagpur (West Bengal)
54.	Indian Institute of Technology Roorkee	Roorkee (Uttarakhand)
55.	Indian Institute of Technology Ropar	Rupnagar (Punjab)
56.	Indian Institute of Technology (BHU)	Varanasi (Uttar Pradesh)
57.	Indian Institute of Technology Bhubaneswar	Khordha (Odisha)
58.	Indian Institute of Technology Bombay	Mumbai (Maharashtra)
59.	Indian Institute of Technology Delhi	New Delhi (Delhi)
60.	Indian Institute of Technology Hyderabad	Sangareddy (Telangana)
61.	Indian Institute of Technology (ISM) (formerly known as Indian School of Mines)	Dhanbad (Jharkhand)
62.	Indian Institute of Technology Madras	Chennai (Tamil Nadu)
63.	Indian Institute of Tropical Meteorology	Pune (Maharashtra)
64.	Indian Space Research Organisation	Bengaluru (Karnataka)
65.	Indira Gandhi Centre for Atomic Research	Kalpakkam (Tamil Nadu)
66.	Institute for Plasma Research	Gandhinagar (Gujarat)
67.	Institute of Basic Science	Agra (Uttar Pradesh)
68.	Institute of Energy and Climate Research, Forschungszentrum Jülich	Jülich (Germany)
69.	Institute of Materials Science	Bhubaneswar (Odisha)
70.	Institute of Nuclear Medicine & Allied Sciences	New Delhi (Delhi)
71.	Institute of Physics	Bhubaneswar (Odisha)
72.	International Centre for Genetic Engineering and Biotechnology,	New Delhi (Delhi)
73.	INFN Legnaro National Laboratory (LNL)	Legnaro (Italy)
74.	IUC-DAEF, Calcutta Centre	Kolkata (West Bengal)
75.	IUC-DAEF, Indore Centre	Indore (Madhya Pradesh)
76.	Jawaharlal Nehru Centre For Advanced Scientific Research	Bengaluru (Karnataka)
77.	Jaypee Institute of Information Technology	Noida (Uttar Pradesh)
78.	Joint Institute for Nuclear Research	Dubna (Russia)
79.	Kalinga Institute of Industrial Technology	Bhubaneswar (Odisha)
80.	Malaviya National Institute of Technology Jaipur	Jaipur (Rajasthan)
81.	Massachusetts Institute of Technology	Cambridge (USA)
82.	Maulana Azad National Institute of Technology (also known as National Institute of Technology)	Bhopal (Madhya Pradesh)
83.	Ministry of Defence (R & D Orgn)	Delhi

84.	Motilal Nehru National Institute of Technology (formerly Motilal Nehru Regional Engineering College)	Allahabad (Uttar Pradesh)
85.	Nanocrystals Technology	USA
86.	National Institute of Material Sciences	Japan
87.	National Institute of Oceanography	Dona Paula (Goa)
88.	National Institute of Science Education and Research	Pune (Maharashtra)
89.	National Institute of Science Education and Research Bhubaneswar	Khurda (Odisha)
90.	National Institute of Technology	Silchar (Assam)
91.	National Institute of Technology	Tiruchirappalli (Tamil Nadu)
92.	National Institute of Technology Hamirpur	Hamirpur (Himachal Pradesh)
93.	National Institute of Technology Kurukshetra	Kurukshetra (Haryana)
94.	National Institute of Technology Rourkela	Rourkela (Odisha)
95.	National Institute of Technology Srinagar	Srinagar (Jammu and Kashmir)
96.	National Institute of Advanced Studies	
97.	National Museum	New Delhi (Delhi)
98.	National Physical Laboratory	New Delhi (Delhi)
99.	NCCCM/BARC	Hyderabad (Telangana)
100.	NCSRFrance	
101.	Oak Ridge National Laboratory	USA
102.	Physical Research Laboratory	Ahmedabad (Gujarat)
103.	P.E.S. Institute of Technology	Bengaluru (Karnataka)
104.	Raja Ramanna Centre for Advanced Technology	Indore (Madhya Pradesh)
105.	Research Centre Imarat, DRDO	Hyderabad (Telangana)
106.	Saha Institute of Nuclear Physics	Kolkata (West Bengal)
107.	Sant Longowal Institute of Engineering & Technology	Sangrur (Punjab)
108.	Semi-Conductor Laboratory	Mohali (Punjab)
109.	Shree Devi Institute of Technology	Mangaluru (Karnataka)
110.	Solid State Physics Laboratory, DRDO	New Delhi (Delhi)
111.	S.N. Bose National Centre for Basic Sciences	Kolkata (West Bengal)
112.	SUNAG Laboratory, Institute of Physics	Bhubaneswar (Odisha)
113.	Tata Institute of Fundamental Research	Mumbai (Maharashtra)
114.	Thapar Institute of Engineering & Technology (Thapar University)	Patiala (Punjab)
115.	Thakur College of Science and Commerce	University of Mumbai
116.	The Institute of Science	Mumbai (Maharashtra)
117.	The National Academy of Sciences	Prayagraj (Uttar Pradesh)
118.	The National Centre for Polar and Ocean Research (formerly known as the National Centre for Antarctic and Ocean Research)	Goa
119.	UGC-DAE-Consortium For Scientific Research	Indore (Madhya Pradesh)
120.	UGC-DAE-Consortium For Scientific Research	Kolkata (West Bengal)
121.	UM-DAC Centre for Excellence in Basic Sciences	Mumbai (Maharashtra)
122.	Variable Energy Cyclotron Centre	Kolkata (West Bengal)
123.	Vidya Prasarak Mandal's Polytechnic	Thane (Maharashtra)
124.	Visva-Bharati	Santiniketan (West Bengal)
125.	Wadia Institute of Himalayan Geology	Dehradun (Uttarakhand)

6.2 STUDENT PROGRAMME

6.2.1 B.Sc(Physics) Summer Students Programme, June 2019

G. Rodrigues

The B.Sc(Physics)Summer Students Programme which is being held annually in IUAC, was organized and held at IUAC in the last year during the period June 03rd-28th, 2019.

A total of 317 applications from 14 states/union territories were received through the online portal. In order to limit the total number of projects which were subjected to availability of IUAC resource personnel to guide the students in their respective areas of specialization and availability of accommodation in IUAC hostel and guest house, a criterion point with a cut-off value of 89 % was selected to restrict the number of selected candidates to ~ 14. Location of the current affiliation (college/university/institution) was considered for determining each candidate's representation from a particular state/union territory.

Effectively 11 students were assigned various projects related to Materials Science, Atomic and Molecular Physics, Nuclear Physics and Accelerator Physics. Special lectures by experts from various disciplines were organized to cater to the students, a wide area of research possibilities. All students have successfully completed their projects and it has benefitted both IUAC and the students.



Figure 1. B.Sc (Physics) Students who participated in the IUAC Summer Programme, 2019

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 M. Sc. Orientation programme is three weeks. It is open throughout the year. Student can apply for this programme based on their convenient time. Applications can be submitted online only. This flexibility allows the students to choose the project period without hampering their main study course. Following students participated in this programme.

Details of this programme can be accessed at: <http://www.iuac.res.in/sc/msc/index.html>

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.

About a month before the semester commences, a poster containing details of course modules, schedule etc. is uploaded on the IUAC website. Printed version of the poster is sent to physics departments of various universities and colleges for inviting applications from research scholars and interested faculty members who are pursuing their PhD degree in physics. Accommodation and TA/DA is provided to the selected participants.

6.2.4 Teaching lab Activities

The Teaching lab was established in 2005 as a part of IUAC's outreach program, mainly develop computer interfaced laboratory equipment and training college/university teachers. The hardware and software developed under this project are open sourced, other open source designs from external sources are also utilized. The latest device, ExpEYES-17, is used for providing training on computer interfaced science experiments. The software is now getting upgraded to support several Indian languages and this work is being done by volunteers from the academic community.

During 2019 we have conducted two "One Week Training Programs" at IUAC, around 20 teachers participating in each program. One day workshops were conducted at IIT Kanpur, University of Calicut, Carmel College at Goa, PRS University Raipur, R V College Bangalore and the Bangalore North University.

6.3 LIBRARY

Priyambada Nayak

Salient features

Working hours:	Round the clock, all days of the week
Total Books:	~2910 (broadly covering the subjects Nuclear Physics, Materials Science, Nanotechnology, Electronics, Computer Science, Radiobiology, 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:	174
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 UGC-INFONET 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 2019 – 2020

23 April	IUAC Acquaintance Programme at Rajiv Gandhi Central University, Itanagar (Contact Person: R.P. Singh)
29 Apr.-4 May	Training Programme on Computer Interfaced Science Experiments (Contact Person: B.P. Ajith Kumar)
3-28 June	Summer Programme for B.Sc. (Physics) Students (Contact Person: G.O. Rodrigues)
5-7 July	User's Workshop (Contact Person: S. Chopra)
8 July	66th AUC Meeting (Contact Person: S. Chopra)
15-20 July	School of Nuclear Reactions (Contact Person: S. Nath and K.S. Golda)
29 July	IUAC Acquaintance Programme at DDU University, Gorakhpur (Contact Person: N Madhavan)
19 August	Ph.D Programme: Monsoon Semester starts (Contact Person: S. Muralithar)
21-23 August	IUAC Academic Workshop (Contact Person: P. Sugathan)
17-18 September	Workshop on Results from recent INGA Campaign and Future Perspectives (Contact Persons: R.P. Singh and S. Muralithar)
30-5 October	Training Programme on Computer Interfaced Science Experiments (Contact Person: V.V.V. Satyanarayana)
15-19 October	International Conference on Nanostructuring with Ion Beams at IGCAR, Kalpakkam (Contact Persons: A. Tripathi and Dr. B.K. Panigrahi, (IGCAR)
21 October	IUAC Acquaintance Programme at Kanchi Mamunivar Centre for Postgraduate Studies , Pondicherry (Contact Person: P. Sugathan)
1-15 November	School and Workshop on Detectors (Contact Persons: A. Jhingan and Archana Sharma(CERN)
11 November	IUAC Acquaintance Programme at Patna University, Patna (Contact Person: P.N. Prakash)
18-21 November	Indian Particle Accelerator Conference – In PAC-2019 (Contact Person: R. Mehta)
26-29 November	Insilco Quantum Modelling Studies (Contact Person: S. Mookerjee)
16-18 December	User's Workshop
19 December	Foundation Day Programme & 67th AUC Meeting
27 Dec. 2019 to 30 April, 2020	Linac Beam Campaign
20 January	Ph.D Program: Winter Semester Starts (Contact Person: S. Muralitar)
13-14 February	JRF/SRF/RA/PDF Six Monthly Presentations (Contact Person: A. Tripathi)

24-26 February	Academic Group Presentations (Contact Person: P. Sugathan)
27 February	JNU/IUAC Academic Committee Meeting (Contact Person: S. Muralitar)
28 February	National Science Day (Contact Person: Saif A. Khan)
5-6 March	Presentations on AY/FY 2019-20 and plans for AY/FY 2020-21 (Contact Person: N. Madhavan)
16 March	Workshop on Radiochemistry for Brachytherapy: Problems and Prospects (Contact Person: R.P. Singh)

6.5 FORTHCOMING EVENTS: 2020

8-9 April	IUAC School on Materials Science at Sikkim University, Gangtok (Contact Persons: A. Tripathi and S. Mukhopadhyay)
18-21 April	School on Geochronology (Contact Person: S. Chopra)
22 April	Acquaintance Programme at RMLAU, Faizabad, UP (Contact Persons: K.S. Golda and K.K. Varma)
20-24 April	Symposium on Quantum world: Active learning in the laboratory (Contact Persons: O.S.K.S. Sastri, CUHP and V.V.V. Satyanarayana)
27-2 May	Training Programme on Computer Interfaced Science Experiments (Contact Person: V.V.V. Satyanarayana)
1-26 June	Summer Programme for B.Sc. (Physics) Students (Contact Person: S.A. Khan)
5-7 July	User's Workshop
8 July	68th AUC Meeting
10-11 July	JRF/SRF/RA Six Monthly Presentations (Contact Person: A. Tripathi)
17 August	PhD Program: Monsoon Semester Starts (Contact Person: S. Muralithar)
20 August	JNU/IUAC Academic Committee Meeting (Contact Person: Dr. S. Muralithar)
10 September	IUAC Acquaintance Programme at Goa University, Goa (Contact Persons: Subir Nath and Rajesh Kumar Shankar Hyam)
14-18 September	School on Nuclear Structure (Contact Person: R.P. Singh)
22-23 September	Workshop on HR-SIMS/AMS (Contact Persons: Sunil Ojha and Pankaj Kumar)
28-3 October	Training Programme on Computer Interfaced Science Experiments (Contact Person: V.V.V. Satyanarayana)
8-12 October	International School on Ion Beam in Materials Science (Contact Person: and K. Asokan and Indra Sulania)

13-16 October	6th International Conference on Ion Beams in Materials Engineering and characterization (Contact Persons: Tripathi and Fouran Singh)
3-4 November	IUAC School on Nuclear Physics at Central University, Tamil Nadu (Contact Persons: N. Madhavan and V. Madhurima)
5-6 November	School on ECR Ion Source Technology: Opportunities and Future Challenges (Contact Person: Pravin Kumar)
16-20 November	Advanced Workshop on In-Silico Quantum Modelling Studies (Contact Persons: S. Mookerjee and Saif A. Khan)
23-28 November	Modeling and Simulation using GEANT4 in Physics (Contact Person: P. Sugathan)
16-18 December	User's Workshop
19 December	Foundation Day Programme & 69th AUC Meeting

6.6 LIST OF PH.D AWARDEE

The following scholar has completed the Ph.D thesis work during 2019-20.

- Chetna Tyagi. Thesis title: "Study of Structural and Optical properties of 2D materials (graphene Oxide and Molybdenum DiSulphide) under ion beam irradiation."

6.7 LIST OF PUBLICATIONS IN THE YEAR 2019-20

A. NUCLEAR PHYSICS

1. **Simulation of a recoil mass spectrometer for measurement of differential quasi-elastic scattering cross sections**, Rohan Biswas and S. Nath, *Eur. Phys. J. A* **56**, 1 (2020).
2. **Nuclear shapes and symmetries seen through measurement of short lifetimes**, P. Das, H. K. Singh, U. Lamani, S. Muralithar, and R. P. Singh, *Acta Phys. Pol.* **B51**, 103 (2020).
3. **Possible antimagnetic rotational band in ^{127}Xe** , S. Chakraborty, H. P. Sharma, S. S. Tiwary, C. Majumder, P. Banerjee, S. Ganguly, S. Rai, Pragati, S. Muralithar, R. P. Singh, S. S. Bhattacharjee, S. Kumar, Mayank, A. Kumar, and R. Palit, *J. Phys. G: Nucl. Part. Phys.* **47**, 015103 (2020).
4. **Evaporation residue measurements of compound nuclei in the $A \approx 200$ region**, P. Jisha, A. M. Vinodkumar, B. R. S. Babu, S. Nath, N. Madhavan, J. Gehlot, A. Jhingan, T. Banerjee, Ish Mukul, R. Dubey, N. Saneesh, K. M. Varier, E. Prasad, A. Shamlath, P. V. Laveen, and M. Shareef, *Phys. Rev. C* **101**, 024611 (2020).
5. **Evaporation-residue-gated spin distribution measurements of the highly fissile compound nucleus $^{224}\text{Th}^*$ through $^{16}\text{O}+^{208}\text{Pb}$ and $^{18}\text{O}+^{206}\text{Pb}$ reactions**, M. M. Hosamani, N. M. Badiger, N. Madhavan, I. Mazumdar, S. Nath, J. Gehlot, A. K. Sinha, S. M. Patel, P. B. Chavan, T. Varughese, Vishal Srivastava, Md. Moin Shaikh, P. Sandya Devi, P. V. Laveen, A. Shamlath, M. Shareef, S. K. Duggi, P. V. Madhusudhana Rao, G. Naga Jyothi, A. Tejaswi, P. N. Patil, A. Vinayak, K. K. Rajesh, Abhishek Yadav, A. Parihari, Rohan Biswas, Monalisha Dhibar, D. P. Kaur, M. Ratna Raju, and J. Joseph, *Phys. Rev. C* **101**, 014616 (2020).
6. **Searching the reason for sub-barrier fusion enhancement through multineutron transfer channels**, Khushboo, N. Madhavan, S. Nath, A. Jhingan, J. Gehlot, B. Behera, S. Verma, S. Kalkal, and S. Mandal, *Phys. Rev. C* **100**, 064612 (2019).
7. **Asymmetric fission around lead: The case of ^{198}Po** , Shilpi Gupta, C. Schmitt, K. Mahata, A. Shrivastava, P. Sugathan, A. Jhingan, K. S. Golda, N. Saneesh, M. Kumar, G. Kaur, L. Stuttgé, D. Arora, H. Arora, A. Chatterjee, K. Chauhan, S. K. Duggi, D. P. Kaur, V. Mishra, Prashant N. Patil, and K. Rani, *Phys. Rev. C* **100**, 064608 (2019).

8. **Investigation of signature inversion in ^{126}I through lifetime measurements**, Himanshu Kumar Singh, Pragya Das, Bhushan A. Kanagalekar, S. Muralithar, and R. P. Singh, *Phys. Rev. C* **100**, 064306 (2019).
9. **Examination of break-up fusion in the $^{16}\text{O}+^{148}\text{Nd}$ system through measurements of forward recoil range distributions and angular distributions**, Pankaj K. Giri, Amritraj Mahato, D. Singh, Sneha B. Linda, Harish Kumar, Suhail A. Tali, M. Afzal Ansari, R. Kumar, S. Muralithar, and R. P. Singh, *Phys. Rev. C* **100**, 054604 (2019).
10. **Measurement of fusion evaporation residue cross sections in the $^{48}\text{Ti}+^{138}\text{Ba}$ reaction**, K. K. Rajesh, M. M. Musthafa, N. Madhavan, S. Nath, J. Gehlot, Jhilam Sadhukhan, P. Mohamed Aslam, P. T. Muhammed shan, E. Prasad, M. M. Hosamani, T. Varughese, Abhishek Yadav, Vijay R. Sharma, Vishal Srivastava, Md. Moin Shaikh, M. Shareef, A. Shamlath, and P. V. Laveen, *Phys. Rev. C* **100**, 044611 (2019).
11. **In-beam spectroscopic study of ^{63}Zn** , U. S. Ghosh, S. Rai, B. Mukherjee, A. Biswas, A. K. Mondal, K. Mandal, A. Chakraborty, S. Chakraborty, G. Mukherjee, A. Sharma, I. Bala, S. Muralithar, and R. P. Singh, *Phys. Rev. C* **100**, 034314 (2019).
12. **Probing incomplete fusion dynamics and role of the projectile deformation in the $^{19}\text{F}+^{154}\text{Sm}$ system**, D. Singh, P. K. Giri, A. Mahato, S. B. Linda, R. Tripathi, H. Kumar, M. Afzal Ansari, N. P. M. Sathik, R. Ali, R. Kumar, S. Muralithar, and R. P. Singh, *Eur. Phys. J. A* **55**, 164 (2019).
13. **Observation of quasi- γ bands in Te nuclei**, S. S. Tiwary, H. P. Sharma, S. Chakraborty, C. Majumder, G. H. Bhat, J. A. Sheikh, P. Baneerjee, S. Ganguly, S. Rai, Pragati, Mayank, S. Kumar, A. Kumar, S. S. Bhattacharjee, R. P. Singh, and S. Muralithar, *Eur. Phys. J. A* **55**, 163 (2019).
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16. **Systematic study of the break-up fusion process in the $^{12}\text{C}+^{165}\text{Ho}$ system and interplay of entrance channel parameters**, Suhail A. Tali, Harish Kumar, M. Afzal Ansari, Asif Ali, D. Singh, Rahbar Ali, Pankaj K. Giri, Sneha B. Linda, R. Kumar, Siddharth Parashari, S. Muralithar, and R. P. Singh, *Phys. Rev. C* **100**, 024622 (2019).
17. **Systematic study of low-energy incomplete-fusion dynamics in the $^{16}\text{O}+^{148}\text{Nd}$ system: Role of target deformation**, Pankaj K. Giri, D. Singh, Amritraj Mahato, Sneha B. Linda, Harish Kumar, Suhail A. Tali, Siddharth Parasari, Asif Ali, M. Afzal Ansari, Rakesh Dubey, R. Kumar, S. Muralithar, and R. P. Singh, *Phys. Rev. C* **100**, 024621 (2019).
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21. **Evolution of collectivity and evidence of octupole correlations in ^{73}Br** , S. Bhattacharya, T. Trivedi, D. Negi, R. P. Singh, S. Muralithar, R. Palit, I. Ragnarsson, S. Nag, S. Rajbanshi, M. Kumar Raju, V. V. Parkar, G. Mohanto, S. Kumar, D. Choudhury, R. Kumar, R. K. Bhowmik, S. C. Pancholi, and A. K. Jain, *Phys. Rev. C* **100**, 014315 (2019).

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23. **γ -vibration in ^{198}Hg** , S. Chakraborty, H. P. Sharma, S. S. Tiwary, C. Majumder, P. Banerjee, S. Ganguly, S. Muralithar, R. P. Singh, G. H. Bhat, J. A. Sheikh, and R. Palit, *Eur. Phys. J. A* **55**, 46 (2019).
24. **An annular parallel plate avalanche counter for heavy-ion γ -ray coincidence measurements**, Akhil Jhingan, H. J. Wollersheim, R. Kumar, M. Saxena, R. Ahuja, M. Kumar, S. Dutt, N. Saneesh, T. Varughese, S. K. Mandal, and P. Sugathan, *Nucl. Instrum. Methods Phys. Res. A* **922**, 209 (2019).

B. MATERIALS SCIENCE

1. **100 MeV Silicon $^{9+}$ swift heavy ion irradiation - Strategic defect annealing approach to enhance the electrical conductivity of few-layered MoS $_2$ sheets - PVA nanocomposite film**, A. Ratan, S. Kunchakara, M. Dutt, A. Tripathi, and V. Singh, *Vacuum* **169**, 108939 (2019).
2. **200 MeV Ag $^{15+}$ swift heavy ion beam induced property modifications in Nb $_2$ O $_5$ thin films by fluence variation**, R. Rathika, M. Kovendhan, D. P. Joseph, K. Vijayarangamuthu, A. S. Kumar, C. Venkateswaran, K. Asokan, and S. J. Jeyakumar, *Journal of Physics and Chemistry of Solids* **135**, 109089 (2019).
3. **200 MeV Ag $^{15+}$ ion beam irradiation induced modifications in spray deposited MoO $_3$ thin films by fluence variation**, R. Rathika, M. Kovendhan, D. P. Joseph, K. Vijayarangamuthu, A. S. Kumar, C. Venkateswaran, K. Asokan, and S. J. Jeyakumar, *Nuclear Engineering and Technology* **51**, 1983 (2019).
4. **Aluminum induced crystallization of amorphous Si: Thermal annealing and ion irradiation process**, G. Maity, R. Singhal, S. Dubey, S. Ojha, P. K. Kulriya, S. Dhar, T. Som, D. Kanjilal, and S. P. Patel, *Journal of Non-Crystalline Solids* **523**, 119628 (2019).
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6. **Analysis of 80-MeV Carbon and 80-MeV Nitrogen Ion Irradiation Effects on N-Channel MOSFETs**, A. Anjum, T. M. Pradeep, N. H. Vinayakprasanna, N. Pushpa, A. Tripathi, and A. P. G. Prakash, *IEEE Transactions on Device and Materials Reliability* **19**, 696 (2019).
7. **Analysis of the carrier conduction mechanism in 100 MeV O $^{7+}$ ion irradiated Ti/n-Si Schottky barrier structures**, H. K. Chourasiya, P. K. Kulriya, N. Panwar, and S. Kumar, *Nuclear Instruments and Methods in Physics Research Section B: Beam Interactions with Materials and Atoms* **443**, 43 (2019).
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1. **Reduction of metastatic potential by inhibiting EGFR/Akt/p38/ERK signaling pathway and epithelial-mesenchymal transition after carbon ion exposure is potentiated by PARP-1 inhibition in non-small-cell lung cancer**, Priyanka Chowdhury, Payel Dey, Sourav Ghosh, Asitikantha Sarma and Utpal Ghosh, *BMC Cancer* **19**, 829 (2019).

G FABRICATION OF NUCLEAR TARGETS

1. **Self-supporting thin tin targets fabricated by ultra-high vacuum evaporation for heavy-ion induced reactions**, Arshiya Sood, G. R. Umaphathy, Arzoo Sharma, S. R. Abhilash, S. Ojha, D. Kabiraj, Akashrup Banerjee and Pushpendra P. Singh, *Vacuum*, **172**, 109107, (2020).
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6. **Fabrication and characterization of enriched $^{154,144}\text{Sm}$ and $^{142,148}\text{Nd}$ targets on Al-backing for nuclear physics experiments at IUAC, New Delhi, India**, Pankaj Giri, Amritraj Mahato, D. Singh, Sneha Linda, Abhilash S. R., Nabendu K. Deb, G. R. Umaphathy, S. , D. Kabiraj and S. Chopra, *Ind. J. Pure Appl. Phys.*, **57**, 675, (2019).

6.8 LIST OF SEMINARS CONDUCTED IN THE YEAR 2019-20

<i>S. No.</i>	<i>Date</i>	<i>Title</i>	<i>Name & Affiliation</i>
1.	25/04/2019	Chirality, Wobbling and Chiral Wobblers	Prof. Umesh Garg, Prof. Of Physics, University of Notre Dame, USA
2.	29/04/2019	Symmetry Breaking of CP – Can it explain our presence in the Universe?	Prof. Natrajan Panchapakesan, Prof. Of Physics (Retd.) Department of Physics and Astrophysics, University of Delhi, Delhi
3	30/05/2019	Reactor Facility at Egyptian Atomic Energy Authority (EAEA)	Prof. Mohd. Gaheen Head, Department of Nuclear Safety and Radiological Emergency EAEA, Egypt
4.	17/07/2019	Rejoice that you are doing basic Research	Prof. D.K. Srivastava, Raja Ramanna Fellow, Former Director, Variable Energy Cyclotron Centre, Kolkata
5.	02/08/2019	Fair Project Progress and Physics Opportunities	Prof, Juergen Gerl, FAIR, Darmstadt, Germany
6.	23/08/2019	The Universe in Collision	Dr. Sanjay Kumar Swain, Associate Professor, NISER, Bhubaneswar
7.	22/12/2019	Power Crates low Noise Power Supply	Mr. Thomas Berner, M/s W-IE-NER-R Power Electronics GmNH, Germany
8.	07/01/2020	How to write a Scientific Paper Well	Prof. Umesh Garg, University of Notre Dame, USA
9.	09/01/2019	Magnetoelectric Nanorobot	Dr. Soutik Betal, Ph/d University of Maryland, USA
10.	10/01/2020	Introduction and Industrial Application of CVD Diamond	Prof. T.G. Kim, Pusan University, South Korea
11.	27/01/2020	GSI and FAIR Facility: Beam Diagnostics Perspective	Dr. Rahul Singh, Beam Instrumentation Group, GSI & FAIR GmbH
12.	20/02/2020	A new Mechanism of Ion Acceleration and their Interaction with Dense Magnetized Plasma	Dr. Atul Kumar, Institute for Plasma Research, Bhat, Gandhinagar
13.	27/02/2020	Smart 3D Materials : Flame based Advanced Nanostructuring and Applications	Prof. Yogendra Kumar Mishra, Mads Clausen Institute, NanaSYD, University of Southern Denmark
14.	18/03/2020	Melting of Shell Effects and Radiating Dumbbells – Two interesting problems in Nuclear Physics.	Prof. V.M. Datar, INO Cell, TIFR, Mumbai
15.	18/03/2020	Nobel Prizes in Nuclear Physics	Prof. V.M. Datar, INO Cell, TIFR, Mumbai

6.9 LIST OF TECHNICAL REPORTS/MEMOS

A. List of Technical Reports

S. No.	Reference No.	Title	Category	Name
1.	IUAC/TR/YM/2019-20	Technical Report on Circulator Interlock System for 97MHz RF Amplifier	Instrumentation	Yaduvansh Mathur, Parmanand Singh, S. Venkataramanan, S.K. Saini & U.K. Rao
2.	IUAC/TR/AG/2019-20	Technical Report on Spectroscopy amplifier cum Discriminator module	Instrumentation	Arti Gupta, S. Venkataramanan, P. Sugathan
3	IUAC/TR/SVR/2019-20	Technical Report on Pre-amplifiers for multi-wire proportional counters (MWPC)	Instrumentation	S. Venkataramanan, Arti Gupta
4.	NSC/TR/AG/2019-20	Technical Report on Quad channel Level Adapter Module	Instrumentation	Arti Gupta, S. Venkataramanan,

B. List of Technical Memos

S. No.	Reference No.	Title	Category	Name
1.	IUAC/TM/RKG/2019-20	Test Report on “Troubleshooting the Door Interlock Problem of LEIBF High Voltage Area”	Instrumentation	R.K. Gurgar, U.K. Rao, Y. Mathur
2.	IUAC/TM/RKG/2019-20	Test Report on “Troubleshooting the high voltage open stack module of 400 KV deck power supply of LEIBF”	Instrumentation	R.K. Gurgar, U.K. Rao, Y. Mathur
3	IUAC/TM/RKG/2019-20	Test Report on “Troubleshooting the GPIB-RS232 interface Boxes for LEIBF”	Instrumentation	R.K. Gurgar, U.K. Rao, Y. Mathur

6.10 SCHOOLS, WORKSHOPS, ACQUAINTANCE PROGRAMMMES, FOUNDATION DAY & NATIONAL SCIENCE DAY CELEBRATIONS

Indian Particle Accelerator Conference (InPAC-2019)

R Mehta

The ninth Indian Particle Accelerator Conference (InPAC-2019), sponsored by Board of Research in Nuclear Sciences, Department of Atomic Energy and Indian Society for Particle Accelerators, was organized at Inter-University Accelerator Centre (IUAC), New Delhi during November 18-21, 2019. The InPAC conference provides the accelerator physicists & technologists of the country a platform to share their work and exchange knowledge, expertise and ideas in the various aspects of particle accelerators.

This conference was the latest in the highly successful series of Indian Particle Accelerator Conferences (InPAC). InPAC was highly successful in attracting accelerator scientists, engineers, students and industrial exhibitors interested in every aspect of the science and technology of particle accelerators. Participants from the accelerator community having interest in the challenging aspects relating to accelerator science and technology contributed and shared their valuable experience. Large number of participants presented their contributions during this conference. There were 272 participants, including 7 participants from abroad (BARC - 35, RRCAT - 60, TIFR - 3, VECC - 32, IUAC - 81, SAMEER-9, IPR & IGCAR -11, Universities & Other Institutes - 13, Industries - 28)

The conference was inaugurated by Dr. D P Singh, Chairman University Grants Commission. Shri D Das, Director Raja Ramanna Centre for Advanced Technology was Guest of Honour. The scientific programme had 81 oral presentations spread over 17 sessions and 235 poster contributions spread over 2 sessions. Programme included thrust areas of accelerators like Electron, Proton, Heavy Ion & Superconducting Accelerators, Synchrotron Radiation Sources, Free Electron Lasers, Accelerating Structures, Ion Sources, Beam Dynamics & Transport, Diagnostics & Control, Magnet Design & Technology, Instrumentation & Control Systems, Power Supplies, RF & Microwave Technologies, Vacuum Technology, Superconductivity and Cryogenics, Radiation Safety, New Acceleration Techniques and New Facilities, Medical, Industrial and other Application.





Inaugural Function InPAC-2019



Memories of InPAC-2019

5th International Conference on Nanostructuring with Ion Beams (ICNIB 2019), IGCAR Kalpakkam, Nov 6-8, 2019

A. Tripathi

The 5th International Conference on Nanostructuring with Ion Beams (ICNIB 2017) was organized by IGCAR Kalpakkam, India, in cooperation with the and Inter-University Accelerator Centre (IUAC), New Delhi and Ion Beam Society of India (IBSI). The conference was held at IGCAR Kalpakkam during Nov 6-8, 2019. IUAC has been organising conferences on the topic of Nanostructuring with Ion Beams (NIB) and the last four conferences in this series were held in Allahabad, Jaipur and Agra and Indore in 2011, 2013 2015 and 2017. The topics on Synthesis of buried nanostructures by energetic ions, Nano dots and nano ripples by ion induced sputtering and surface diffusion, Synthesis of nanostructures by ion or atom assisted deposition techniques, Ion beam induced modifications of materials, thin films, polymer micro/nanostructures and related simulations were covered in the conference. The conference was co-chaired by Dr BK Panigrahi (IGCAR) and Dr G Amrendra (IGCAR) and the inaugural address was given by Prof AC Pandey, Director, IUAC. The conference had twenty-eight invited, ten oral talks and 60 poster contributions. The IBSI gave the prizes for best oral presentation and best poster presentation by research scholars.

A preconference School on Ion Beams in Materials Science with focus on “Radiation damage in nuclear materials” preceded the conference on Nov 4-5, 2019. The school had 9 lectures, including 3 from abroad.



IUAC School on Nuclear Reactions 2019

S. Nath and K. S. Golda

IUAC School on Nuclear Reactions 2019 was held at IUAC from July 15 – 20, 2019. Fifty research scholars and young faculty members from different universities and national institutes, working in the field of nuclear reactions, attended the school. The curricula of the school included all major types of nuclear reactions. All energy domains i.e. astrophysical, low, intermediate and relativistic were covered with proper balance of theoretical and experimental aspects of the topics. Eminent speakers from all over the country were invited to teach the subject of their expertise. The list of speakers included Dr. D. K. Srivastava (VECC, Kolkata), Dr. S. Bhattacharya (VECC, Kolkata), Dr. S. Kailas (CBS, Mumbai), Prof. A. Mukherjee (SINP, Kolkata), Prof. G. Gangopadhyay (University of Calcutta, Kolkata), Dr. J. Sadhukhan (VECC, Kolkata) besides speakers from IUAC. A few tutorial sessions were conducted to make the participants familiar with the computational tools frequently used in the field. One session was dedicated for presentations by the participants. Dr. D. K. Srivastava delivered a special evening lecture titled “Rejoice that you are doing basic science”, which was attended and appreciated by a large audience. Soft copies of the study material were shared with the participants at the end of the school.



Workshop on INGA experiments: Recent results and future perspectives

S. Muralithar

A workshop on 'INGA experiments: Recent results and future perspectives' was organised at IUAC during 17–18, September, 2019. Many research scholars benefited by presenting results of INGA experiments, followed by in-depth discussions. The topics discussed included data reduction, interpretation of data, future Ge-array configuration, ancillary devices to be developed and written in project format for funding and data policy to be adopted by IUAC for experiments done at IUAC.

Acquaintance Program at RGU, Rono Hills, Doimukh, Arunachal Pradesh:

R.P.Singh and Pravin Kumar

One day user acquaintance program (April. 25, 2019) on inviting the proposals for pursuance of internationally competitive research using IUAC accelerator facilities was held at Rajiv Gandhi University (RGU), Rono Hills, Doimukh, Arunachal Pradesh. In association with Prof Sanjeev Kumar, Head of Physics Department, Dr R P Singh and Dr. Pravin Kumar, Scientists, IUAC co-ordinated this program and delivered talks on accelerator based infrastructures at IUAC and their utilization for advanced research in nuclear physics and materials science, respectively. The program started with the inaugural speech by Prof Amitava Mitra, Chief Guest of the event & Vice Chancellor (in-charge), RGU, who highlighted the principles of physics and role of associated technologies in economical growth of the country. Total 58 participants including students and faculties attended the event. Based on enthusiasm shown by students, additional meeting was held next day with Prof Saket kushwaha, VC, RGU for discussion on long term research opportunities with accelerators and hand on experience/training to the dynamic students especially from north east region. Soon after this event, a research proposal submitted by a scholar, RGU had been sanctioned in AUC-66 based on her presentation.





IUAC Acquaintance Programme at DDUGU, Gorakhpur

N. Madhavan and Fouran Singh

IUAC Acquaintance programme was held at the Department of Physics, Deen Dayal Upadhyay Gorakhpur University (DDUGU), Gorakhpur on September 18, 2019 with the kind cooperation and active support of Prof. Shantanu Rastogi, Head and other faculty members of Department of Physics. Prof. Hari Saran, Pro-VC of DDUGU presided over the inaugural programme and encouraged the participants to make full use of IUAC facilities. Dr. Ravi Shankar Singh (Dean, Students' Welfare) was the Co-ordinator from DDUGU. More than 100 registered participants took part in the event which was covered by the local media. The participants were M. Sc. and Ph. D. students and faculty members from DDUGU and nearby places. The talks delivered during the programme covered (i) Introduction to IUAC, Accelerator/Experimental facilities and scope of usage, (ii) Nuclear Physics/Atomic Physics/Molecular Physics research using IUAC facilities (both by Dr. N. Madhavan, IUAC), (iii) Materials Science and Radiation Biology Research (by Dr. Fouran Singh, IUAC) and (iv) talks on individual research (carried out mostly at IUAC) by Udai Bhan Singh, Dr. Rajan Walia, Dr. Kusum Rawat and Dr. R. P. Yadav (all from DDUGU). The event concluded with an open discussion session and feedback from participants.

IUAC Acquaintance Program at Department of Physics, Kanchi Mamunivar Centre for Post Graduate Studies, Puduchery.

P. Sugathan and K. Asokan

Physics Department of Kanchi Mamunivar Centre for Postgraduate Studies, Puduchery and IUAC New Delhi jointly conducted one day acquaintance program at KMCPG, Puduchery on on October 21st 2019. One day program was arranged for physics teachers, young researchers and post graduate students from local colleges to acquaint themselves with IUAC accelerator facilities and the research opportunities in the field of Nuclear Physics, Materials Science, Accelerator Mass Spectrometry (AMS) etc.

The program was attended by teachers and students from university and nearby colleges. Dr. S Ramadasse, Head of the Dept of Physics greeted the gathering and Dr. S. Narayana Kalkura, Director of Crystal growth Centre inaugurated the function with the lighting of lamp and his inaugural address. Dr D. Aravazhi Irissappan, Director of KMCPGS. delivered the presidential address. IUAC resource persons, Dr P. Sugathan and Dr K. Asokan presented the overview of research facilities and opportunities for experimental research in nuclear physics, materials science, and accelerator mass spectrometry. Post lunch, Dr S. Narayana Kalkura delivered special lecture on study of Bio crystals. Presentations were made by D.M. Selvapandian on X-ray analysis, Dr. G. Suresh on SEM and TEM analysis, Dr. R. N. Bhowmik on experiment proposal at IUAC and Dr Santhosh Kuamr on spectroscopic analysis of Ayurvedic nano drug. It was followed by discussion where possibilities of doing projects and procedures for beam time application was discussed. The program concluded with vote of thanks by Dr. Santhosh Kumar, Convener of the programme. Total of 159 participants from 14 institutes registered and attended the program.



Acquaintance Programme at Patna University

P.N. Prakash and Saif Ahmad Khan

A one day Acquaintance Programme was organized by IUAC on November 11, 2019 at Physics Department, Patna University (PU), Patna. More than 100 participants from 6 nearby universities, two institutes; including NIT, Patna, and a dozen colleges, attended the programme. Prof. Surabhi Prasad, Head, Physics Dept., PU, Convened the event and Dr. Sandeep Garg was the Organizing Secretary. In the morning, after the inaugural session, Dr. Prakash presented an overview of the accelerator facilities in IUAC, the various academic programmes conducted by the Centre, and appraised the participants on how to apply and avail accelerator beam time. In the afternoon, Dr. Saif presented details on the various experimental facilities and went over the online and offline facilities in materials science in detail. Dr. Sandeep Garg and Dr. Ranjeet Karn, Kolhan University presented their research work using IUAC facilities. Dr. Neeraj Shukla, NIT, Patna presented glimpses of materials science research using ion beams. In the concluding interactive session, students, young researchers asked questions and sought clarifications on the proceedings of the day.



Meeting on ‘Radiochemistry for Brachy therapy: Problems and Prospects’

In modern times particle accelerators are used as advanced technical tools for medical applications. A workshop was planned on 16th March 2020 on ‘Brachy therapy: Problems and Prospects’. This workshop was scaled down to a meeting with people from Delhi-NCR region only due to the onset of COVID-19 pandemic. However, about 20 experts from the fields of accelerators, oncology, nuclear physics, radiobiology, medical physics, radiochemistry, radiobiological simulations and material science participated in the meeting.

Prof. A. C. Pandey (Director, IUAC) mentioned the need for research and application of radiation for brachy therapy and the prospective role of present and future accelerators at IUAC. He also informed that a proton beam line facility is being developed for irradiation purpose and suggested to explore possibilities to use this facility for radio therapy and radiation biology studies.

It was noted in the meeting that it is possible to use IUAC accelerators to explore production of some of the isotopes important for brachy therapy and other medical applications. It was recognized that many big hospitals and medical facilities in Delhi-NCR region need these isotopes and if they can be produced in IUAC then loss of radioactivity due to transit time could significantly be reduced. The meeting was presided by Prof. G.K. Mehta (Former Director, IUAC) and conducted by DR. R. P. Singh (Scientist-G, IUAC).



30TH FOUNDATION DAY CELEBRATION

P. Sugathan

The 30th Foundation Day of IUAC was celebrated on December 19, 2019. The function was held in Maharshi Kanad auditorium of IUAC. Dr. Srikumar Banerjee, Homi Bhabha Chair Professor and former Chairman, Department of Atomic Energy presided over the function. Prof. Annapurni Subramaniam, Director, Indian Institute of Astrophysics, Bangalore delivered the foundation day lecture titled “The First Indian Space Observatory ‘ASTROSTAT’: Impact on Indian Astronomy”. A brief report on the academic activities of the centre was presented by Prof. Avinash Chandra Pandey, Director IUAC. The importance of selecting career in basic research was emphasized by Dr. Srikumar Banerjee in his presidential talk. Presence of many dignitaries including former directors of IUAC, Director of Consortium for Educational Consortium (CEC), members of Governing Board and Accelerator User Committee of IUAC made the program noticeable. Users, visitors, Research Scholars, staff members of IUAC, class XI students and teachers from neighboring schools attended the programme. Nine employees were honored for their 25 years of service at IUAC.

Post-lunch session was dedicated for student participants from schools. About 20 schools in the neighborhood participated in the programme; Four science students and one Physics teacher from each school. Dr. P. Sugathan made a short presentation to school participants explaining the importance of particle accelerators in basic research. A guided tour to different accelerators and experimental facilities were conducted to give a flavor of the activities carried out at IUAC. To motivate and encourage the school students, a science exhibition was also arranged which demonstrated 8 table top experiments. The working models exhibited different areas of research at IUAC which included accelerator physics, nuclear physics, cryogenics, condensed matter physics and allied fields. Posters explaining various research activities of IUAC were displayed to convey over all activities of the centre to the students. The programme ended with distribution of certificates to school participants.



Lighting the Lamp

Prof. Annapurni Subramaniam
delivering the Foundation Day Lecture

Prof Annapurni being honoured by Director IUAC



Group Photo

National Science Day programme

A one-day workshop was organized on the occasion of National Science Day on 28th February 2020. About 180 participants, including B.Sc Physics students and faculty member, from nearby colleges/universities attended the workshop. The workshop was hosted by Dr. I. Sulania (IUAC), Mrs. Golda K. S. (IUAC) and Dr. S. Kar (IUAC). The program began in the morning with opening remarks by our director Prof. A. C. Pandey who also introduced the invited speaker Dr. D. K. Aswal (Director-CSIR-National Physical Laboratory, New Delhi) to the audience. Dr. Aswal spoke about the importance of standards in our measurements and informed the participants about the revised SI units and their implications. This was followed with a talk titled “A Particle Accelerator: How it works and why it matters” by Mr. R. Mehta (IUAC). Thereafter, the colleges took part in the poster contest on the topic “Applications of Particle Accelerators for mankind: a Future View” which was judged by Prof. G. K. Mehta, Dr. R. K. Bhandari and Dr. R. G. Sharma. After lunch session began with talk on Materials Science Research activities at IUAC by Dr. A. Tripathi (IUAC). Best Poster awards were given to three of the colleges who participated in the poster contest. The contact person of the program, Dr. S. A. Khan gave a vote of thanks after which the volunteers from IUAC took the participants to various experimental facilities which were described by the respective resource persons.



Participants of the National Science Day workshop



Dr. Aswal during his talk in the workshop

IUAC Sports and Cultural Activities

Debashish Sen, VVV Satyanarayana, DS Mathuria, Pranav Singh, Indra Sulania, Sudershan Sharma, ET Subramaniam and Abhijit Sarkar

International Yoga Day Celebration:

The Sports and Cultural Committee of IUAC organized a Yoga awareness camp to celebrate the International Yoga Day on June 21, 2019. As in previous year, about 75 people participated in the yoga awareness camp under the guidance of yoga experts from Sivananda Yoga Vedanta Centre, New Delhi.

Independence Day and Republic Day Celebrations:



Dr. A.C. Pandey, Director IUAC hoisting the National Flag on 26th January 2020

The Independence Day was celebrated at IUAC by organizing competition among participants (primarily children) on various topics like drawing, poem recitation, debate, ladies games in the lounge area of the IUAC auditorium. Games and sports activities for employees and their family members were conducted in the IUAC Football ground on the Republic Day. In both the occasions, prizes were distributed to the winners along with some consolation prizes to toddlers and ladies for encouraging their participation.



Indoor and outdoor competitions at IUAC

As per committee suggestions, a room in the ground floor of the newly built auditorium was converted to a community club room, with facilities like Table Tennis, Carom Board, Chess, etc. Arrangement for daily newspapers and other periodical magazines were also initiated. On Oct. 2, 2019, this Club Room was inaugurated by the Director, IUAC, which is now serving as a popular recreation spot for the IUAC residents.



Club Activities at IUAC

Community Lighting on Diwali:

In order to celebrate a cracker-free Diwali at the IUAC campus, the Sports and Cultural committee organized a Community Lighting Ceremony at the football ground of IUAC campus. Almost 200 residents participated in the celebration by lighting the Diyas and candles.



DIWALI community lighting at IUAC campus

Annual Cultural Program “SPANDAN”



Some glimpses of the annual Cultural program SPANDAN 2019 at MAHARSHI KANAD AUDITORIUM

The annual cultural festival of IUAC “SPANDAN” for the year 2019 organized by the Sports & Cultural Committee was held for the first time in MAHARSHI KANAD AUDITORIUM of IUAC on 9th November, 2019. About 70-80 children supported by the elders, participated in the event adorned by various regional dances, songs, instrumental music, mime show and drama. The programme concluded with the spectacular “Bharat ki Nari” showcasing the various attires and cultures of Indian female folk.