INTER UNIVERSITY ACCELERATOR CENTRE

IUAC

An Inter University Research Facility of UGC

New Delhi, India

Historical dates of Events

DATES	EVENTS
JUN. 19, 1984	The Govt. of India accepted and approved the concept of Inter University Centre
JUL. 9, 1986	Foundation work started
DEC. 11, 1986	Statutory Permission from DDA to start construction
SEP. 30, 1988	The Centre was registered under the Societies Registration Act, XXI of 1860
DEC. 19, 1988	The Centre becomes autonomous
DEC. 19, 1990	Pelletron Accelerator commissioned and dedicated to the nation by Minister of HRD
JUL. 8, 1991	First Pelletron User Experiment performed
AUG. 1991	Gamma Detector Array (GDA) commissioned
DEC. 1991	Heavy ion Reaction Analyser (HIRA) operational
MAR. 1993	Materials Science Beam Line Commissioned
JUN. 1994	Radiation Biology Beam Line Commissioned
MAR. 1996	HIRA-GDA (8 HPGe detectors) coupled facility commissioned
JUN. 26, 1996	LN2 plant commissioning
MAR. 1997	Cryogenic Plant operational
APR.10, 1997	LHe plant commissioning (CCI make)
MAR. 28, 1998	1st off-line LHe transfer to a cryostat (MPC)
DEC. 1998	First Radioactive Ion Beam, 7Be, produced using HIRA
MAR.14, 2001	1st on-line cooldown of LHe distribution line and Buncher cryostat
DEC. 2001	Super Buncher Commissioned
FEB. 2002	Resonator Fabrication Facility Commissioned
MAY 2002	HIRA-INGA (old, 8 Clover Ge detectors) coupled facility based first nuclear physics experiment
SEP. 24, 2004	Commissioning of 1st Module of LINAC
JAN. 2005	Commissioning of High Temperature Superconducting ECR Ion Source
MAR.10, 2005	AMS beamline in beam hall 1 commissioned
MAY 9, 2005	^{10}Be signal detected from standard sample using AMS facility at IUAC (first time in the country)
JUN. 2005	The Centre renamed as INTER-UNIVERSITY ACCELERATOR CENTRE
AUG.23, 2005	Successful detection of 10Be from Manganese Nodules using AMS facility at IUAC.
SEP. 24, 2005	Inauguration of the new Materials Science and LEIB Building
DEC. 2005	Commissioning of old Neutron array (24 detectors) in Beam Hall II
AUG. 12, 2006	Inauguration of Engineering Building
FEB. 2008	INGA campaign 1st phase at IUAC (with 14 Clovers) starts
DEC. 2008	Commissioning of Hybrid Recoil mass Analyzer (HYRA) 1st phase
MAY 26, 2010	Successful detection of 26Al signal from standard samples using AMS facility at IUAC.
JUN. 2010	HYRA – TIFR Spin Spectrometer coupled facility based first nuclear physics experiment
SEP.15, 2010	AMS Clean chemistry laboratory inaugurated by Secretary, Ministry of Earth Sciences, Govt of India
AUG. 5, 2011	Commissioning of second LINAC accelerating Module
FEB. 22, 2012	LHe plant commissioning (LINDE make)
DEC. 7, 2012	Commissioning of third LINAC accelerating Module
JAN. 2013	Focal plane isomer studies using HYRA – first experiment
DEC. 17, 2014	Fund received from DAE-BRNS to start FEL activity
JUN.4, 2015	New AMS facility for ^{14}C, ^{10}Be & ^{26}Al based on dedicated 500kV Pelletron accelerator operational
JUN. 2015	New NAND array (100 detectors) based first nuclear physics experiment
MAY 2016	INGA campaign at IUAC starts

Inter-University Accelerator Centre (IUAC), earlier known as Nuclear Science Centre (NSC), is an autonomous Inter University Centre established in the year 1984 by University Grants Commission (UGC) under the Ministry of Human Resource Development (MHRD). The Centre, which came up as a green-field project, is spread over 25 acres of land provided by Jawaharlal Nehru University in Qutub Institutional Area of New Delhi. The main aim of the Centre has been to establish a national institute to provide internationally competitive, front-ranking Accelerator based research facilities to the researchers from Indian Universities, Research Institutes and other National Laboratories in the fields of Nuclear Science, Materials Science, Radiation Biology, Atomic Physics, Accelerator Mass Spectrometry, etc. The Centre was established, considering the great demand in the Indian research community, to not only provide accelerator based research facilities but also to develop world class accelerators and research programmes.

The construction of the Laboratory Complex and other infrastructure for establishing the Centre started in the year 1986 and it was dedicated to the nation in 1990. In the short span of four years (1986-1990), the complete infrastructure of the Centre was built which was supposed to be a record time for setting up of an operational accelerator laboratory for carrying out regular experiments using the energetic beams of various ions available from the Accelerator. The Centre became fully operational in the year 1991, and since then it has been fulfilling its mandate by providing research facilities round-the-clock to more than 700 research groups from nearly 160 Universities, 85 Colleges and 60 other National laboratories. Till now, more than eleven hundred fifty Ph.D. Scholars completed their theses using the state of the art research facilities of the Centre, A large number of research papers have been published in reputed international refereed science citation indexed (SCI) journals. In the year 2005, Nuclear Science Centre was renamed as Inter- University Accelerator Centre (IUAC), which reflects the character and mandate of the Centre.

Why a Particle / Ion Accelerator for Research?

Question may arise as to the use of an accelerator. Basically, an accelerator produces charged particles of one type of nuclei, speeds them up to a few per cent of the speed of light using electromagnetic fields and bombards the particles on to a target consisting a , usually, different set of nuclei. Surrounding the collision zone are various kinds of detectors which record the many remnants and radiation produced in the reaction process. Accelerators thus solve two problems for physicists. First, since all particles behave like waves, physicists use accelerators to increase a particle's momentum, thus decreasing its wavelength enough that physicists can use it to probe tine confines inside atoms and nuclei. The accelerator is today's most powerful microscope. The resolving power is linked to the wavelength of the accelerated particles, which is equal to h/p, where h is Planck's constant and p is the momentum of the particle. This shows that larger the momentum the smaller is the wavelength, which makes it possible to achieve the high resolution needed to explore the interior of matter. At high particle energies the interior of matter can be explored with a resolution that other probes like visible light cannot achieve. Also, the energy of accelerated particles is used to create the other unstable particles, which usually do not exist in nature, which physicists wish to study. With more powerful accelerators and higher collision energies more massive and sometimes new types of particles can be discovered and studied. Two nuclei cannot come close enough because of the repulsive Coulomb force acting between their constituent positively charged protons. High velocity of nuclei implies high energy of incident nuclei, enabling them to overcome the repulsion and reach close enough to target nuclei so that the short range, strong attractive nuclear force will lead to nuclear reactions. High velocity ions are deflected by atoms of target material and this helps in Materials Analysis i.e. to know the composition of any target material. The effects of accelerated charged particles on biological systems at the molecular level and on crucial semicondutor chips used in satellites (which encounter energetic charged particles in outer space) also give us idea about the induced radiation effects of the ion beams. AMS or Accelerator Mass Spectrometry is used to measure very low concentration (of the order of 1 in 10^{15}) of trace elements. Long lived radioisotopes, produced through nuclear reactions, serve as tracers and chronometers in many branches of science, e.g. Geology, Archeology, Hydrology, Environmental Science, Bio-medicine, Cosmo-Chemistry, Nuclear Physics, etc. AMS is also used to determine isotopes at infinitesimal trace levels in semiconductors, geological samples and other materials.

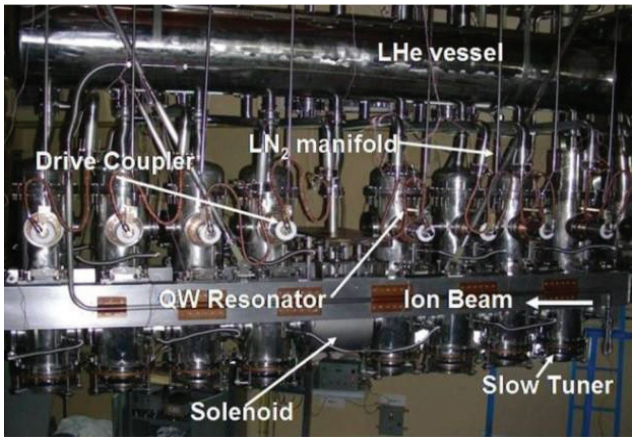
Mission Statement

The basic objective of Inter-University Accelerator Centre (IUAC) is to provide front ranking accelerator based research facilities for internationally competitive research in multi-disciplinary areas. The Centre, as the first inter-university research institute within the University system, has been playing a crucial role with its Scientific and Technical staff having dual responsibility of facilitating cutting-edge research for a large user community as well conducting their own research and development to open new vistas of advanced research activities. Emphasis is laid on encouraging group activities and sharing of the facilities at the Centre in synergy with those existing elsewhere. The Centre has designed and commissioned various sophisticated accelerator systems and experimental facilities, in project mode, involving several universities/institutes for research in the areas of Nuclear Physics, Materials Science, Ion-Molecule Collisions, Atomic Physics, Radiation Biology, Radiation Physics and Accelerator Mass Spectrometry. More than 700 research groups from Universities, Institutes and Laboratories, from India and abroad, have been using the facilities round the clock, seven days a week, for nearly three decades.

Ion Accelerators at IUAC Delhi

IUAC has commissioned different types of accelerators such as Tandem Van de Graaff Accelerators, Superconducting Linear Accelerator, Radio Frequency Quadrupole and Drift Tube LINAC for High Current injector, Electron Cyclotron Resonance ion source based ion implanters, negative ion implanter, etc. These accelerators can provide a wide range of ion energies from few tens of eV to several hundreds of MeV. In addition, IUAC has designed and commissioned many advanced experimental facilities for research and a High Performance Computing facility for the researchers from all over the country.

The 15UD Pelletron Accelerator: It is a Tandem Van de Graaff Ion accelerator and is the biggest in India and one of the world's about half a dozen operational large Tandem Accelerators with terminal potential above 15 Million Volts. The 15UD Pelletron, having terminal potential achievable up to 16MV using compressed geometry accelerating tubes, has been operational since 1990. Thousands of researchers have been utilizing the high energy beams from this Ion Accelerator regularly. The Accelerator is housed in a 26 metre tall pressurised tank within the 50 metre tall tower and is protected with the help of Earthquake Rams. It can accelerate ions of most of the elements in the periodic table. The facility has been extensively used not only for basic research in Nuclear Science, Materials Science, Atomic Physics, Radiation Biology and Earth Sciences but also in many strategic national projects such as the effect of high LET ionising radiation on the electronics components for satellites, Geological Dating of Geological samples and artefacts, Radiation effects on the Cancer Cells, etc. which have societal impact.



Super Conducting LINear ACcelerator (SC-LINAC): The maximum energy of ions from the Pelletron (~50 to 250 MeV, depending on the ion species) limits the research programme in various fields. A niobium based Superconducting **Linear Accelerator (LINAC), operating at Liquid Helium temperature (4.2 K)** has been developed as the booster accelerator for augmentation of the energy of ion beams (upto a mass region of ~100 amu) to nearly double the energy. This advanced technology has now been established at IUAC with required infrastructure. The superconducting LINAC programme of IUAC consists of 27 Quarter Wave Resonators made from bulk Niobium. The LINAC accelerator is being extensively used for Nuclear Physics experiments and a large number of research programs have been completed using the beams from Pelletron-LINAC combined facility.

Low energy Ion Beam Accelerators: Two unique **Low Energy Ion Beam Facilities (LEIBF)** have also been developed and made operational at IUAC. A **positive ion beam facility** has been setup using an Electron Cyclotron Resonance (ECR) ion source mounted on a high voltage deck. The **positive ion accelerator (or ion implanter)** provides multiply charged positive ion beams with a wide range of relatively lower, tunable energy (~ 50 keV to about 3 MeV) for experiments in Atomic, Molecular and Materials Sciences.

Negative Ion Accelerator (Implanter)

Positive Ion Accelerator (Implanter)

The **negative ion accelerator (or implanter)** facility provides negative ion beams up to 200 keV and uses an ion source based on sputtering by cesium ions. This facility is extensively used for ion implantation studies, which have wide applications in pursuit of Materials Science basic research.

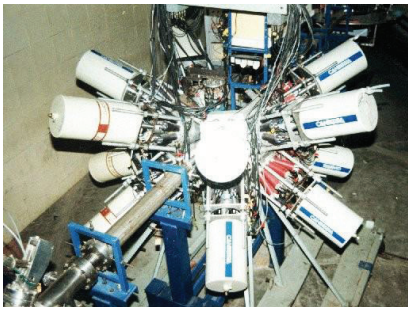
Rutherford Back-Scattering (RBS) facility: A 1.7 MV Pelletron accelerator has been installed at IUAC. The facility is equipped with Alphatros ion source for producing negatively charged He ions, 1.7 MV Pelletron accelerator, a RBS chamber and a 4-axis goniometer. The surface barrier detector measures the number and energy of ions backscattered after colliding with atoms of the sample enabling the determination of atomic mass and elemental concentration versus depth below the surface. H ions can be made available by changing the ion source.

A new state of the art **Accelerator Mass Spectrometry (AMS)** facility for radiocarbon dating has been established at IUAC for dating or time-stamping of geological and prehistoric samples. The facility uses a 500kV Pelletron accelerator and automated graphitization equipment (AGE). AMS is an ultra-sensitive technique (up to a level of ppq) and can be applied for the detection of long-lived radionuclides in many branches of science e.g. Geology, Archaeology, Hydrology, Environmental Science, Bio-medicine, etc. This facility has capabilities to perform ^{10}Be and ^{26}Al measurements as well. The facility is funded by Ministry of Earth Sciences, Govt. of India.

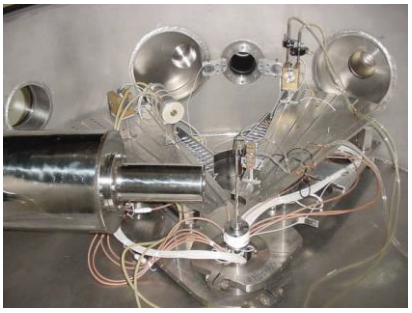
Research Programme at IUAC

The research activities at the Centre are in the areas of Nuclear reactions (transfer, fusion and fission) near Coulomb barrier, High spin spectroscopy, Spectroscopy of highly charged ions, Interaction of swift heavy ions with materials, Characterization and Modification of Materials, Device fabrication, Radiation Biology, Accelerator Mass Spectrometry, Radiation Physics, etc. The advanced experimental facilities at the Centre, many of which are one in a few in the world, are developed and used with active collaboration and participation of the user community. Initial funding for these facilities came from UGC. Other agencies such as DST and BRNS have contributed significantly towards the funding of these facilities.

The **Nuclear Physics** programme covers almost all the current thrust areas (study of stable and unstable nuclei at extreme conditions of excitation energy (temperature), angular momentum and isospin such as nuclear reaction dynamics, target deformation effects, spin distribution studies, role of transfer channels in enhancing sub-barrier fusion cross sections, the dynamical effects of fission delay, nuclear spectroscopy, high spin isomers, Chirality, Magnetic and Anti-magnetic rotations, etc.) through studies of nuclear dynamics and nuclear structure at energies from well below to well above the Coulomb barrier of the various projectile-target systems.

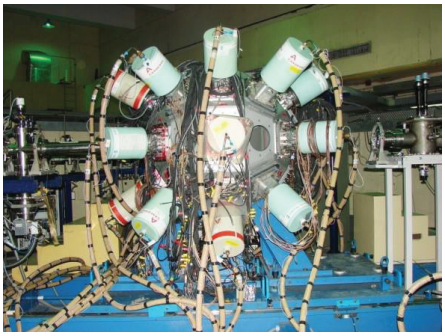


Gamma Detector Array (GDA), consists of 12 Compton suppressed, HPGe detector setup, which was later augmented with a recoil distance based lifetime measuring plunger equipment, a charge particle detector array and an electromagnet for perturbed angular correlation measurement studies.

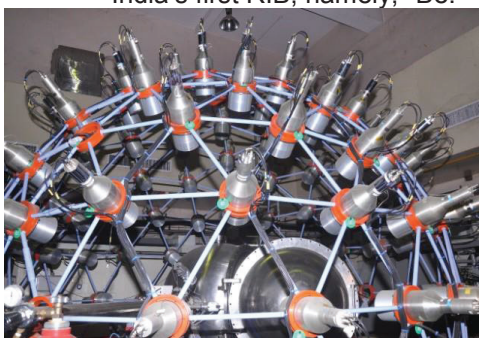


General Purpose Scattering Chamber (GPSC) is being extensively used for both nuclear physics as well as materials science experiments (e.g. the studies of Heavy Ion scattering and transfer reactions above barrier, Projectile Breakup and for ion irradiation).

Heavy Ion Reaction Analyzer (HIRA) is one of the few Recoil Mass Spectrometers (RMS) in the world and the first of its kind in Asia. HIRA facilitates the study of heavy ion induced nuclear reaction dynamics, operates in the direction of primary beam, separates ions of various masses and has provided India's first RIB, namely, ^{7}Be.



The concept of a **national facility for γ-spectroscopy** took shape in early 2000 when a formal agreement between various institutions was achieved for pooling the available resources into **an Indian National Gamma Array (INGA)** consisting of 24 Compton-suppressed Ge Clover detectors with nearly 4π coverage. This is one of a few large gamma detector arrays in the world.

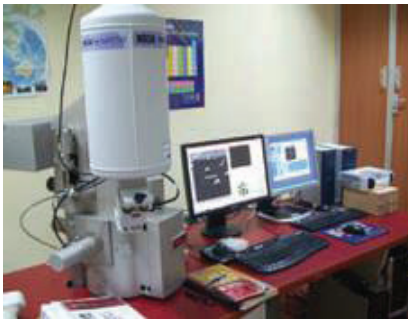


National Array of Neutron Detectors (NAND) is an array of 100 liquid-scintillator based neutron detectors which is used to study fission dynamics through pre- and post- fission neutron multiplicities using beams delivered by Pelletron-LINAC at IUAC. This is one of a few large neutron detector arrays in the world.

HYbrid Recoil mass Analyzer (HYRA) is a unique, state-of-the-art Recoil Mass Spectrometer/Separator in Beam Hall II, which is a dual stage and dual mode device, capable of operating in gas-filled mode and vacuum mode. The 15 m long separator has large background suppression and large efficiency in gas-filled mode and is mass-dispersive with large background suppression in vacuum mode. The vacuum mode can also be used for secondary RIB production. There are only five other gas-filled separators in the world for heavy element detection. The spin spectrometer from TIFR has been coupled to HYRA for unique fusion evaporation residue gated spin distribution measurements and HYRA-INGA combined facility and a dedicated Isomer decay setup at the focal plane are planned to fully exploit the power of the facility. HIRA and HYRA can select one nucleus of interest from among a trillion background particles, all moving together initially.

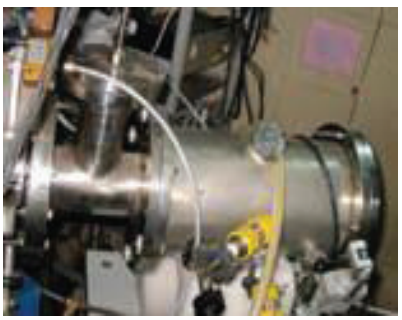
Energetic ions play a vital role in **Materials Science research** as they can produce systems away from thermodynamic equilibrium. Broadly, these energetic ions are useful in three different ways: (i) synthesis of materials, (ii) modification of materials and (iii) characterization of materials. Areas of activities include Defect engineering, Characterization of materials by Elastic Recoil Detection Analysis (ERDA), Production methods for new materials, Interface modifications / Ion Beam Mixing, Electronic Sputtering and surface modifications, Phase transformations, Synthesis and modification of nano-particles, Ion beam induced epitaxial crystallization, etc. There are two beam-lines in the two beam halls for irradiation studies with accelerated ions from Pelletron and LINAC. The beam-line in beam hall I includes two irradiation chambers with on-line ERDA, on-line QMA and ionoluminiscence facilities. Low flux irradiation facility for materials science research is also available in another beam-line.





The beam-line in beam hall II has two irradiation chambers with on-line ERDA and in-situ XRD facilities. In-situ Raman facility is also installed in this beam-line. The XRD facility consists of a 3 kW X-ray source with multi-layer mirror, thin film attachment, postion-sensitive Vantage detector and a high speed position sensitive detector besides a conventional NaI (Tl) scintillation counter. A quadrupole mass analyzer system with SIMS option operating at 2.25 MHz that can mass analyze in the range 1-1024 amu, with mass separation (ΔM/M) better than 0.01, is installed in materials science beam-line. The probe consists of 3 lens optics for detecting both positive and negative ions as well as neutral atoms. A large area position sensitive gaseous detector telescope, developed in-house and installed in materials science beam-line is used in on-line measurement of SHI induced compositional changes with good Z resolution. A Raman microscope which allows high resolution con-focal measurements has been installed and tested off-line in the beam hall-II. The system consists of Ar ion laser with 514.5 nm wavelength and 50 mW power. The set-up can also support multiple lasers, with automatic software switching of excitation wavelength. Exceptional sensitivity for ultra-low signal detection, with minimum noise, is possible with a compact thermo-electrically cooled CCD detector.





The Centre also has many off-line characterization facilities including XRD, AFM/MFM/C-AFM, SEM, Raman, Photoluminescence setup, Transport / Noise measurement setup, Low temperature cryostat with 8 T superconducting magnet, FTIR and UV-Vis absorption spectroscopy setup. There are several materials synthesis facilities including RF Sputtering, ECR plasma based deposition (under progress), e-beam evaporation, Resistive heating evaporation, Atom beam sputtering, Ball-milling, Tubular furnace and Box furnace, etc. A Multi-Mode SPM with Nanoscope is extensively used in AFM, MFM, C-AFM, STM, STS and F-d modes. A field emission scanning electron microscope (FE-SEM, with a resolution of 1.5 nm at 30 kV, has been installed. It has a secondary electron (SE) and a back-scattered electron (BSE) detector for imaging. An energy dispersive X ray detector with 133 keV resolution has also been installed in this system for elemental analysis. A TEM facility with advanced features is planned to be installed in the near future.

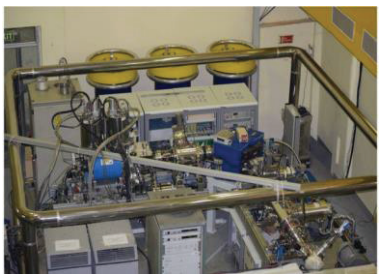
Heavy Ion Radiation Biology is an inter-disciplinary applied science involving Atomic Physics, Nuclear Physics, Molecular Biology and Bio-chemistry. The current research in this field investigates the effects of energetic charged particles on biological systems at the molecular level. The facility provides a laboratory for pre- and post- irradiation treatment of samples. An irradiation system called ASPIRE [Automatic Sample Positioning for Irradiation in Radiation Biology Experiments] is installed at the dedicated Radiation Biology beam-line.

The **Atomic and Molecular Physics** programme at IUAC is based on the two accelerators, the Pelletron-LINAC and the LEIBF. Among the facilities are beam-foil spectroscopy apparatus (both single and multi-foil excitations are used) with X-ray and ion detectors. At the LEIBF, the reaction microscope is used to study molecular dissociation dynamics by using a position-sensitive time-of-flight setup, which has been developed indigenously.

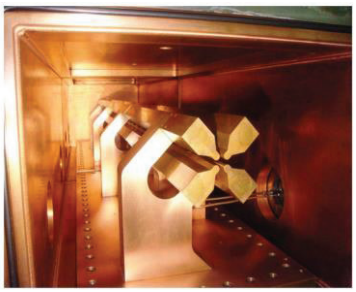
IUAC has setup a high performance computing facility comprising a state-of-the-art data centre, two distributed memory compute clusters totaling more than 70 teraflops, a shared memory system with 256 GB of RAM, and parallel storage systems with a total capacity of 60 terabytes. This facility is meant for all faculty and students of Universities and colleges across the country for research in the areas of nuclear physics, materials science, atomic physics and radiation biology. It now serves an estimated four hundred faculty members and students drawn from more than a hundred and thirty colleges, Universities and institutes The CDAC Param systems and, on a smaller scale, the IUAC clusters are the only facilities available for general use by scientists across the country. The IUAC clusters are heavily used, with typical loads of a hundred and forty jobs running and fifty in wait queue at any given time.

Accelerator Augmentation

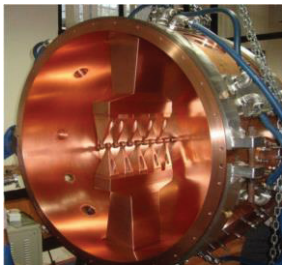
In an effort to deliver higher beam currents and higher charge states to the researchers, a **High Current Injector (HCI)** system is being developed for the superconducting LINAC. The positive ions from a High Temperature superconducting magnet based ECR source **(PKDELIS),** set up on a high voltage platform, will be accelerated by a series of room temperature accelerating structures (a Radio Frequency Quadrupole accelerator **(RFQ)**, and a set of Drift Tube LINAC **(DTLs)** that will enable high currents of highly charged ion beams to be injected into the LINAC.



ECR on HV deck



RFQ



DTL Tank (inside view)

Niobium single spoke resonators

IUAC has set up the necessary infrastructure to construct superconducting niobium resonators. This is the first such facility in the country. The niobium quarter wave resonators for the 2nd & 3rd LINAC modules have been indigenously built using this facility. In addition, IUAC successfully developed the single spoke resonators for Fermi National Lab, USA.

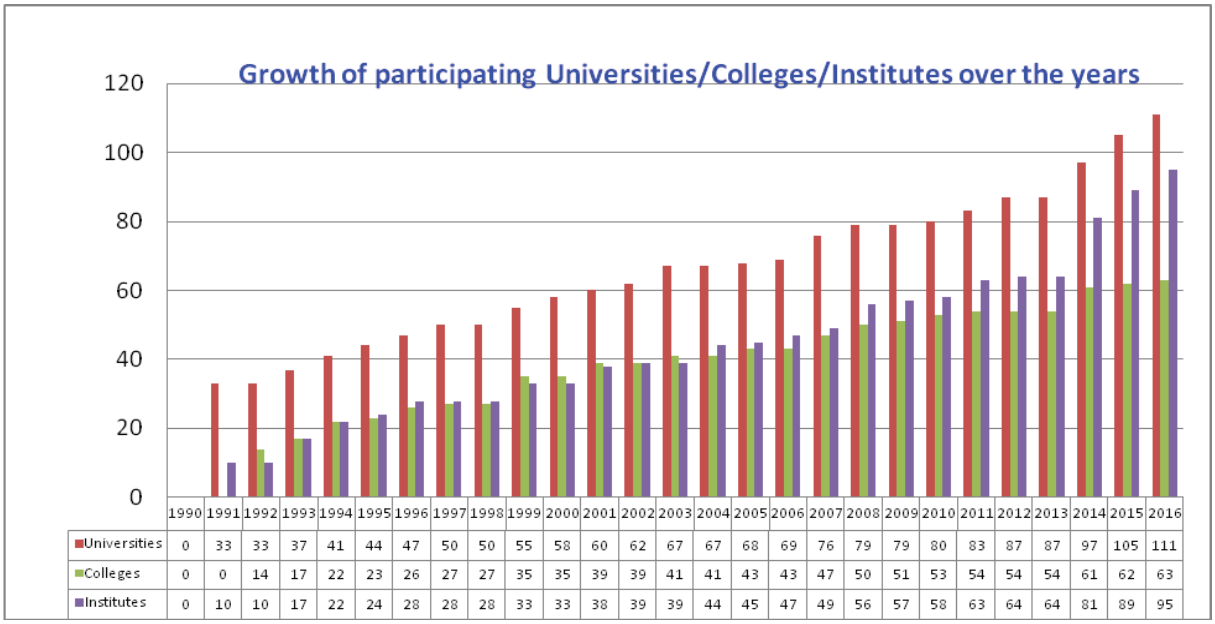
A project named Delhi Light Source **(DLS),** based on **Free Electron Laser (FEL),** is under development at Inter University Accelerator Centre. The facility will consist of an electron accelerator which will produce electrons of energy ~8 MeV with an average current of ~10 nA. The electron beam when injected into the undulator magnet system will wiggle and produce coherent radiation in the range of THz frequency. The electron beam and the THz radiation will be used to do fundamental and applied research in the fields of Chemistry, Biology, Materials Science, Nuclear Physics, Medicine, etc. FEL is a tunable LASER and has numerous applications.

Room Temperature cavity for FEL

IUAC is establishing a national facility for **Geochronology** that will permit measurement of quality isotopic data including relevant characterization at international level. The facility will provide advanced experimental capabilities that are currently non-existent in the country. Accelerator Mass Spectrometry (AMS) using medium and heavy mass radio-nuclides and High Resolution Secondary Ion Mass Spectrometry (HR-SIMS) are two end members of the facilities, capable of dating an entire geological age spectrum from the youngest (years, kilo years) to the oldest (Hadean and Archean rocks and Meteorites, up to ~4.6 Ga), thus covering the geological history of the Earth, the Solar system down to the Neogene/anthropocene. Various other ancillary equipments such as Femto-second Laser ablation ICPMS, IRMS, EPMA, SEM, XRD, XRF, TL/OSL, etc. and sample processing laboratories will also be a part of the geochronology facility.

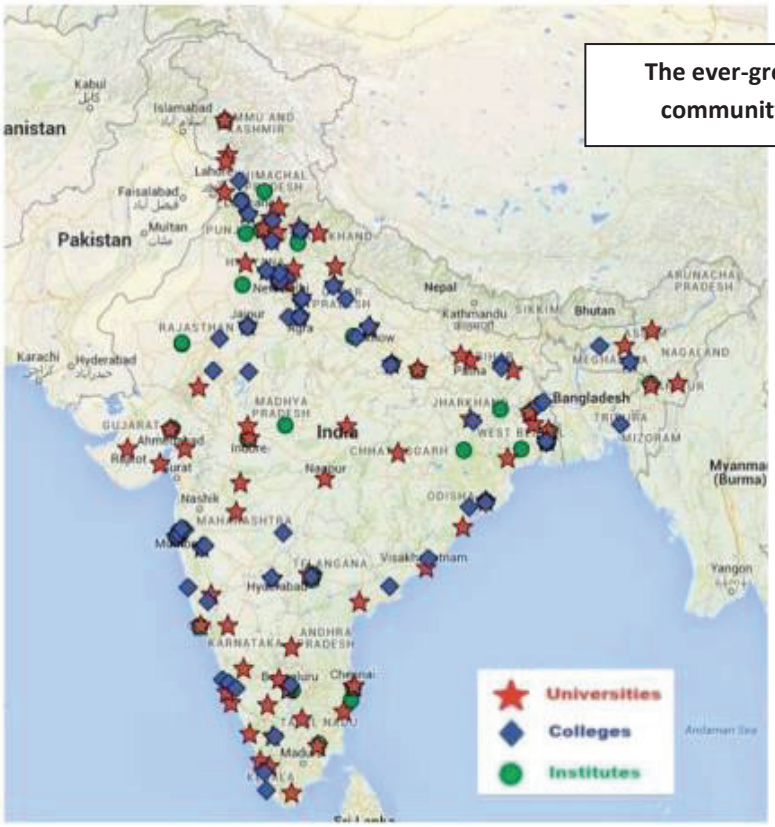
Why an Inter-University Centre

IUAC being an Inter-University Centre, the first in the country, has its main user-base coming from the Universities. The Pelletron-LINAC user base currently has **300 plus faculty members from 111 universities and 63 colleges from the entire length and breadth of the country. In addition, there is participation from the IITs and 90 other national/international research institutions.** Considering all accelerator facilities**,** it is nearly **160 Universities, 85 Colleges and 100 other National/International laboratories.**

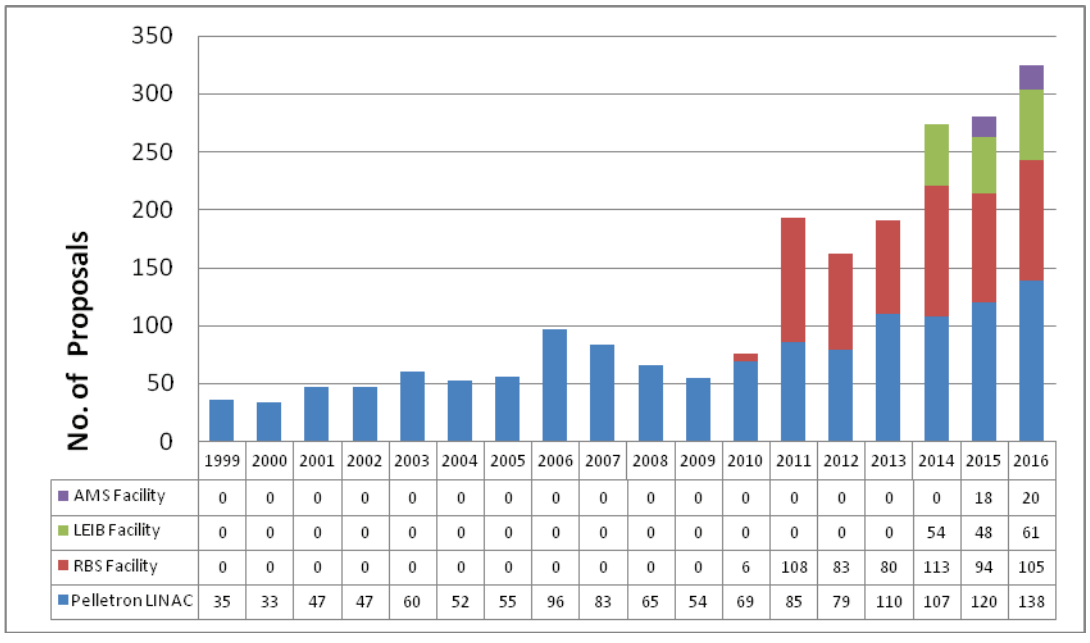


	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Universities	0	33	33	37	41	44	47	50	50	55	58	60	62	67	67	68	69	76	79	79	80	83	87	87	97	105	111
Colleges	0	0	14	17	22	23	26	27	27	35	35	39	39	41	41	43	43	47	50	51	53	54	54	54	61	62	63
Institutes	0	10	10	17	22	24	28	28	28	33	33	38	39	39	44	45	47	49	56	57	58	63	64	64	81	89	95

Beam Time Utilization: Selection of the experiments to be conducted using the accelerator is done by a national scientific body called Accelerator User Committee (AUC). To avail accelerator beam time, one must submit beam time proposal to the AUC-Convener. When invited, they should present it before the AUC members during the meeting. The AUC meets twice every year in July and December to evaluate the projects defended by the potential users. A similar procedure is being followed for funding **User Facility for Research Projects (UFR),** as followed for the beam time. It is open to the University users and if approved by AUC, gets funded for three years.

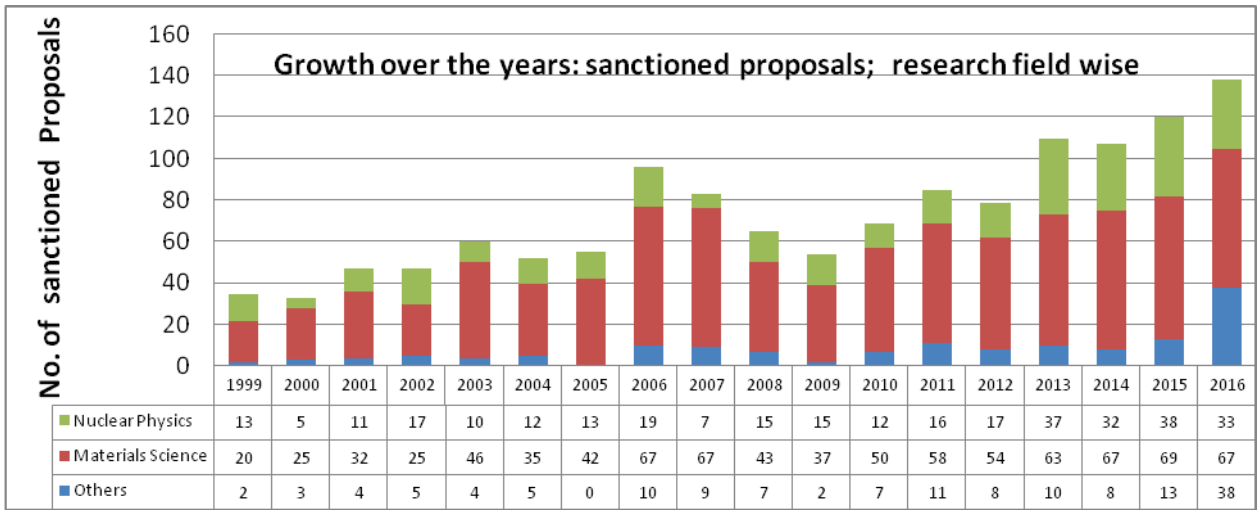


Apart from the Pelletron-LINAC facility, new accelerator facilities, like RBS, Low Energy Ion beam facility, AMS have come up in the last few years. As a result, the number of users (or the number of submitted project proposals) shows a jump as evident from the graphical presentation shown below.

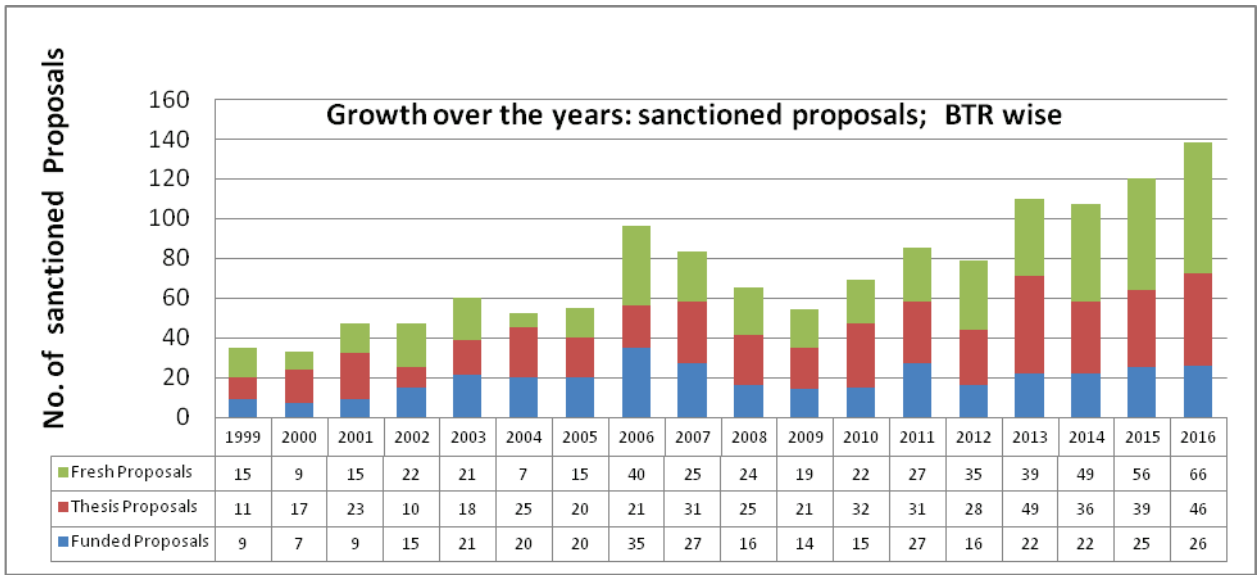


	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
AMS Facility	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	18	20
LEIB Facility	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	54	48	61
RBS Facility	0	0	0	0	0	0	0	0	0	0	0	6	108	83	80	113	94	105
Pelletron LINAC	35	33	47	47	60	52	55	96	83	65	54	69	85	79	110	107	120	138

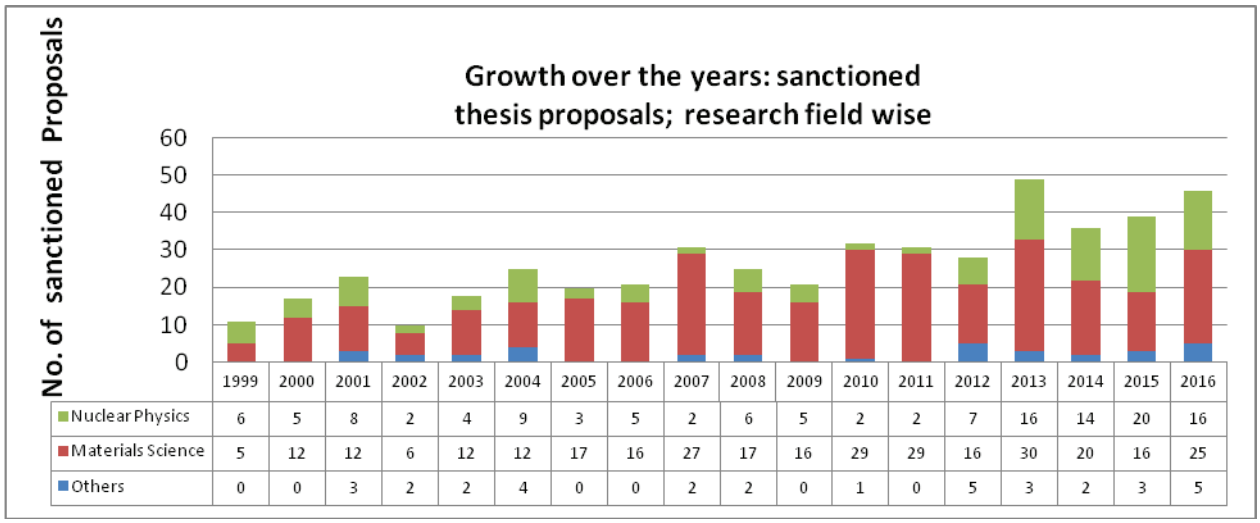
Growth over the years; sanctioned proposals for different accelerator facilities



	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Nuclear Physics	13	5	11	17	10	12	13	19	7	15	15	12	16	17	37	32	38	33
Materials Science	20	25	32	25	46	35	42	67	67	43	37	50	58	54	63	67	69	67
Others	2	3	4	5	4	5	0	10	9	7	2	7	11	8	10	8	13	38

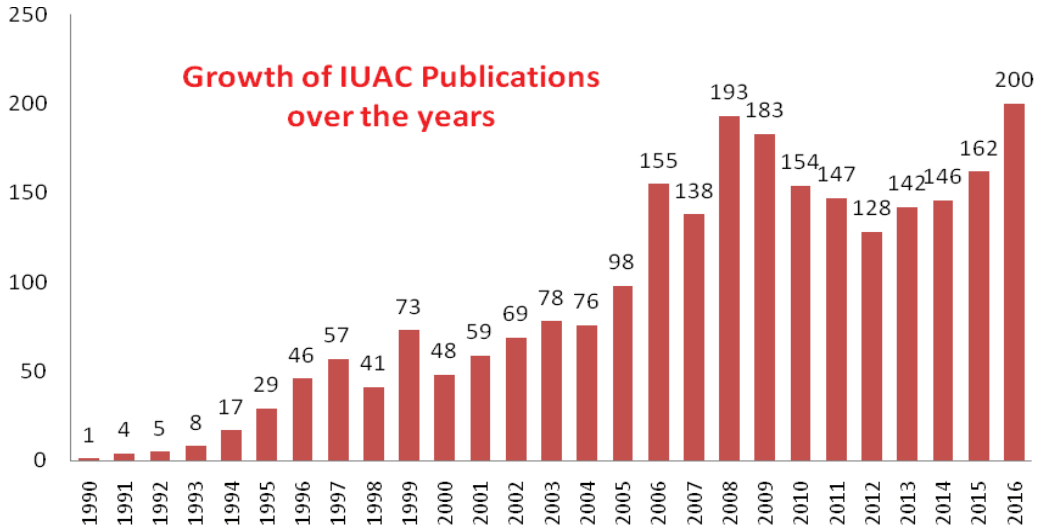


	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Fresh Proposals	15	9	15	22	21	7	15	40	25	24	19	22	27	35	39	49	56	66
Thesis Proposals	11	17	23	10	18	25	20	21	31	25	21	32	31	28	49	36	39	46
Funded Proposals	9	7	9	15	21	20	20	35	27	16	14	15	27	16	22	22	25	26



	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Nuclear Physics	6	5	8	2	4	9	3	5	2	6	5	2	2	7	16	14	20	16
Materials Science	5	12	12	6	12	12	17	16	27	17	16	29	29	16	30	20	16	25
Others	0	0	3	2	2	4	0	0	2	2	0	1	0	5	3	2	3	5

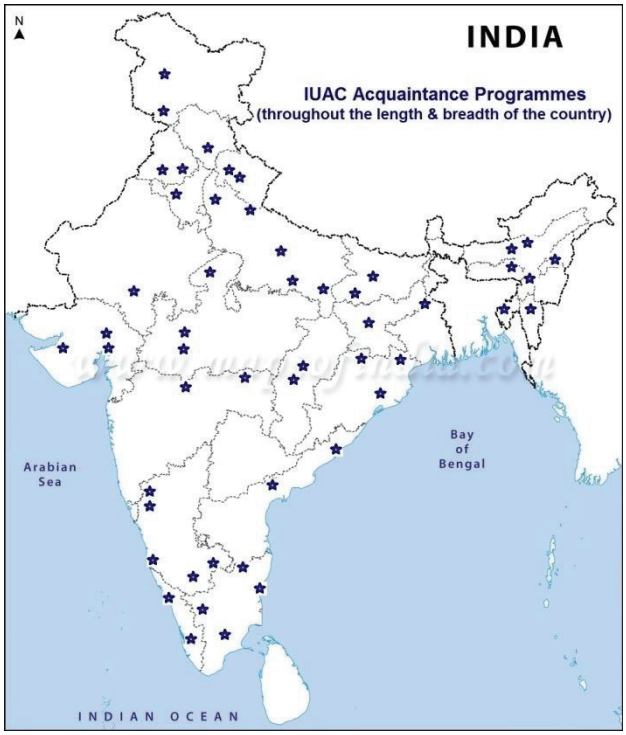
The growth in the user base as well as the demand for Beam time is evident from the graphical representations. Several hundred students have completed thesis projects using IUAC facilities. The large number of publications in peer-reviewed international journals based on the research and developmental activities at IUAC bear testimony to the commitment of IUAC towards excellence in experimental research in internationally competitive, advanced fields. IUAC is committed to guide the scientific community using its unique accelerator based research facilities for carrying out focused research in advanced areas of science and technology.

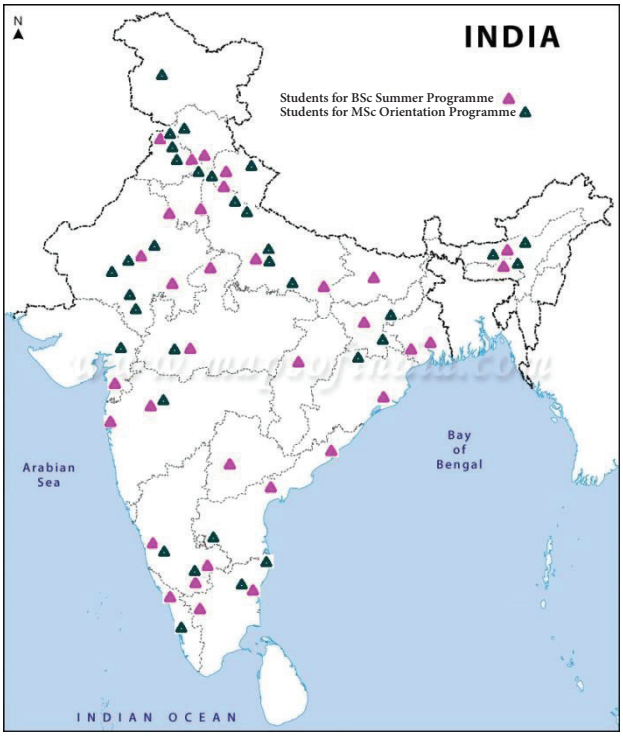


Academic Programme at IUAC

To encourage meritorious students pursuing basic science, a one-month long **Summer Programme for Undergraduate Students** is being conducted for **B.Sc. (Physics) students**, in which they are allotted an experimental project under the supervision of one of the scientists of IUAC.

M.Sc. Orientation programme for three-weeks provides hands-on training in fields associated with accelerator based research to select M. Sc. students by way of short projects offered throughout the year.



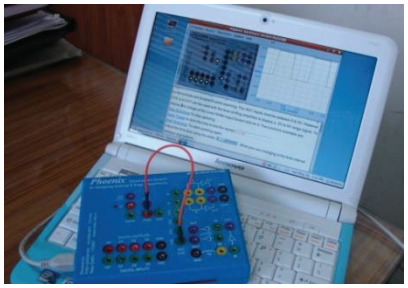


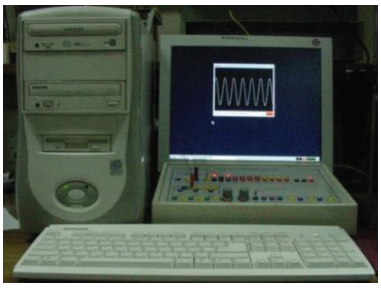
Acquaintance Programme of IUAC is another outreach programme which is conducted in different parts of the country to make the local scientific community aware of the IUAC facilities. The interaction with the IUAC resource persons helps create new potential users for the IUAC facilities. Emphasis is given to hold the programme in those areas from where fewer users exist. The programme is conducted with active participation from a local University/College with one of the existing users as the nodal person.

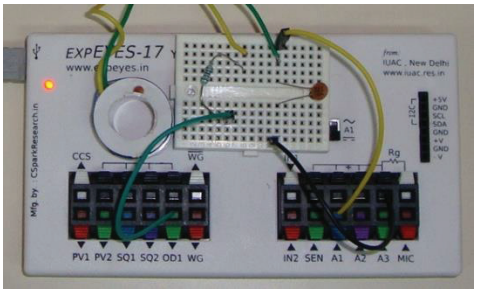
School/College students' visits to the various facilities are arranged throughout the year at IUAC. Special talks, conducted tours and demonstration of different scientific projects are held on the **National Science Day (Feb. 28th)** for College students and on the **Foundation Day of IUAC (Dec. 19th)** for School students.

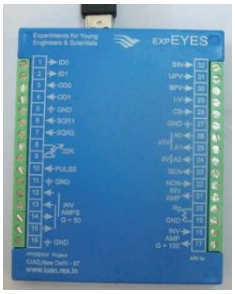
IUAC conducts a two semester **PhD Programme** every year for research students and new scientist trainees of the Centre, which is also open to interested University research scholars. The first semester, during August to December, offers courses in Advanced Physics, Experimental Physics, Computational and Programming Techniques, while the second semester during January to May offers courses in Nuclear Physics, Materials Science and Accelerator Physics. Ph.D. research scholars and interested young faculty members from any University, College or research institute pursuing PhD programme can attend these courses.

Teaching lab Activities: As a part of IUAC's outreach programme, a project was started, named PHOENIX (Physics with Home-made Equipment and Innovative Experiments), with two major objectives; (1) Developing a computer interfaced device capable of performing the role of a number of laboratory equipments, (2) Training college/university teachers in its usage and development of new experiments. The device developed under this project provided a framework to design sophisticated science experiments without getting into the details of electronics or computer programming. It provided a set of ready-made experiments and also enabled teachers to design new experiments with improved precision, reliability and accuracy. Several revisions were done to the initial design over the years. The latest device is named ExpEYES (Experiments for Young Engineers and Scientists). The device is affordable even to an individual so that it enables the student to perform experiments outside the laboratory too. Introducing scientific computation using Python programming language also has been a part of this project. Over the years, it has been inducted into the syllabus of several Universities and a large number of institutions are using it as test equipment and for doing science and engineering projects.







Summary of programmes conducted since 2005:

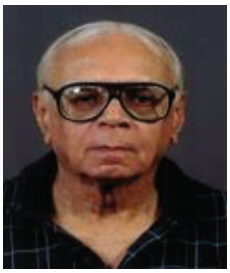
1. Training programme at IUAC: Total 25 numbers, trained around 500 teachers
2. One Day Workshops at places all over India (100 numbers, 10,000 participants; teachers and students).

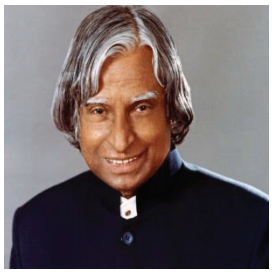
As the number of dedicated programme that could be conducted by IUAC is limited, the users were encouraged to train more people so that it reaches a larger community. As a result, this project has been presented at various national and international events, mostly by the teachers from various Universities and supported by the conference organizers.

3. Workshop, conference presentations & Publications:

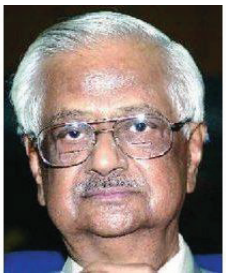
- Python in Science Experiments using Phoenix, Scipy.in 2010, Dec-2010, ISB, Hyderabad
- A Project for Practical Science Experiments, APEC ADOC2, Taipei, Oct-2010
- Workshop on expEYES, RMML 2012, July 2012, Geneva
- ExpEYES, a portable science laboratory, Scipy.in 2012 Conference, Dec-2012, IIT Bombay,
- ExpEYES, a portable science laboratory, FOSS.IN conference, Nov-2012, Bangalore
- Low cost PC with built-in Science Laboratory, RMML 2013, July 2013, Brussels
- An Open Source Portable Science Lab, FOSSASIA, Feb-2014, Phnom Penh City, Cambodia
- Sound Waves and Electromagnetic Induction with ExpEYES, RMML 2014, July 2014, France
- ExpEYES: Pocket Science Lab, FOSSASIA Summit, Mar-2016, Singapore
- Talk and workshop on ExpEYES, FOSSASIA-2017, Aug-2017, Singapore
- Innovative science experiments using Phoenix, 2009, IOP Phys. Educ. Journal 44469
- EM induction experiment to determine the moment of a magnet ,2014, IOP Phys. Educ. 49319
- Plugins for ExpEYES, project funding by Google Summer of Code 2014

FOUNDATION DAY - DECEMBER 19th
EMINENT SPEAKERS AT IUAC OVER THE YEARS

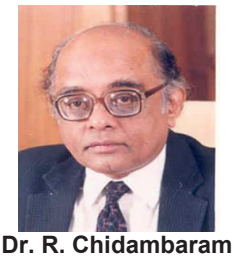

Prof. S. P. Pandya


Dr. A. P. J. Abdul Kalam


Prof. R. A. Mashelkar


Dr. Raja Ramanna


Prof. J. V. Narlikar


Dr. R. Chidambaram


Prof. K. Kasturirangan


Prof. G. Swarup

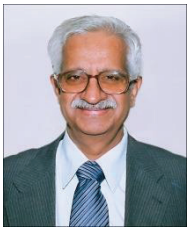

Prof. P. K. Kaw


Prof. S. K. Joshi


Prof. Goverdhan Mehta


Prof. G. Rajasekaran


Prof. Rohini Godbole


Prof. V. S. Ramamurthy


Prof. Asis Datta


Prof. C. N. R. Rao


Prof. A.K. Roychoudhury

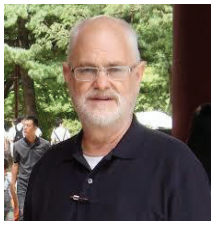

Prof. Bikash Sinha


Dr. Anil Kakodkar


Dr. Shailesh Nayak


Prof. P. Rama Rao


Prof. T.V. Ramakrishnan


Dr. Jerry Nolen


Prof. Ashutosh Sharma


Dr. Sekhar Basu

CENTRE DIRECTORS: PAST & PRESENT

Late Prof. A. P. Patro
(1984 – Oct. 1989)

Prof. G. K. Mehta
(Nov. 1989 – Mar. 2001)

Dr. Amit Roy
(Mar. 2001 – Jul. 2013)

Dr. D. Kanjilal
(Jul. 2013 –)

LOCATION OF THE CENTRE

The Centre is situated 3.8 km from the old campus of Jawaharlal Nehru University, New Delhi. The JNU old campus is beside IIT-Delhi. The Centre is situated on the road going southwards from the old JNU campus. Starting from old JNU campus, the Centre is after JNU east gate, National Institute of Immunology (NII), Indian Institute of Mass Communication (IIMC), Indian Council of Social Science Research (ICSSR) and International Centre of Genetic Engineering & Biotechnology (ICGEB). Southwards of the Centre are Vasant Kunj (Sector B4, B-5/6), Kishangarh and Fortis Hospital, Vasant Kunj.

List of IUAC Users

List of University Users (163)

Agra University (B.R. Ambedkar Univ.), Agra, Uttar Pradesh

Alagappa University, Karaikudi, Tamil Nadu

Aligarh Muslim University, Aligarh, Uttar Pradesh

Allahabad University, Allahabad, Uttar Pradesh

Ambedkar University, New Delhi, Delhi

Amity University, Gurgaon, Haryana

Amity University, Noida, Uttar Pradesh

Amrita University, Bengaluru, Karnataka

Amrita VishwaVidhyapeetam, Coimbatore, Tamil Nadu

Andhra University, Visakhapatnam, Andhra Pradesh

Anna University, Chennai, Tamil Nadu

Annamalai University, Annamalainagar, Tamil Nadu

Assam University, Silchar, Assam

Baba Bhimrao Ambedkar University, Lucknow, Uttar Pradesh

Banaras Hindu University, Varanasi, Uttar Pradesh

Banasthali Vidyapith, Rajasthan

Bangalore University, Bengaluru, Karnataka

Barkatulla University, Bhopal, Madhya Pradesh

Berhampur University, Berhampur, Odisha

Bhagalpur University, Bhagalpur, Bihar

BhagatPhool Singh MahilaVishwavidyalaya, Khanpur Kalan Sonipat, Haryana

Bharathiar University, Coimbatore, Tamil Nadu

Bharthidasan University, Tiruchirappalli, Tamil Nadu

Bhavnagar University, Bhavnagar, Gujarat

Birla Institute of Technology, Mesra, Ranchi, Jharkhand

Bundelkhand University, Jhansi, Uttar Pradesh

Burdwan University, Burdwan, West Bengal

Calcutta Univesity, Kolkata, West Bengal

Calicut University, TrichyPalary, Malapuram, Kozhikode, Kerala

Central University of Jharkhand, Ranchi, Jharkhand

Central University of Himachal Pradesh, Himachal Pradesh

Central University of Gujarat, Gandhinagar, Gujarat

Central University of Haryana, Pali, Haryana

Central University of Karnataka, Gulbarga, Karnataka

Central University of Kashmir, Srinagar, Jammu and Kashmir

Central University of Kerala, Kasaragod, Kerala

Central University of Punjab, Bathinda, Punjab

Central University of Rajasthani, Ajmer District, Rajasthan

Central University of Tamil Nadu, Kangalancherry, Thiruvarur, Tamil Nadu

Chandrakona Vidyasagar Mahavidyalaya, Medinipur, Hisar, Haryana

Chatrapati Sahuji Maharaj Kanpur University, Kanpur, Uttar Pradesh

Chaudhary Charan Singh University, Meerut, Uttar Pradesh

Chaudhary Devi Lal University, Sirsa, Haryana

Chitkara University, Patiala, Punjab

Cochin University of Science & Technology, Cochin, Kerala

Crystal Growth Centre, Anna University, Chennai, Tamil Nadu

Ravenshaw University, Cuttack, Odisha

Deen Bandhu Chhotu Ram University of Science &Tech., Murthal, Haryana

Delhi Technical University, Delhi

Devi Ahilya Vishwavidyalaya, Indore, Madhya Pradesh

DIT University, Dehradun, Uttarakhand

Doon University, Dehradun, Uttarakhand

Dr. Hari Singh Gaur Central University Sagar, Madhya Pradesh

Dr.Babasaheb Ambedkar Marathwada University, Aurangabad, Maharashtra

Dr.Ram Manohar Lohia Avadh University, Faizabad, Uttar Pradesh

Gobind Ballabh Pant University of Agriculture and Technology, Pantnagar, Uttarakhand

Gauhati University, Guwahati, Assam

Gautam Buddha University, Greater Noida, Uttar Pradesh

Guru Govind Singh Inderaprastha University, Dwarka ,New ,Delhi

GLA University, Mathura, Uttar Pradesh

Guru Nanak Dev University, Amritsar, Punjab

Goa University, Goa

Gorakhpur University, Gorakhpur, Uttar Pradesh

Gujarat University, Ahmedabad, Gujarat

Gulbarga University, Gulbarga, Karnataka

Guru Ghasidas Vishwavidyalaya, Bilaspur, Chattisgarh

Guru Jambeshwar University of Science and Technology, Hisar, Haryana

Hemwati Nandan Bahuguna Garhwal University, Garhwal, Uttarakhand

Harcourt Butler Technical University, Kanpur, UttarPradesh

Himachal Pradesh Technical University, Hamirpur, Himachal Pradesh

Himachal Pradesh University, Shimla, Himachal Pradesh

Indira Gandhi National Open University, New Delhi

Indira Gandhi University, Meerpur, Rewari,Haryana.

The North Cap University, Gurgaon, Haryana

The North Cap University, Gwalior, Madhya Pradesh

Jadavpur Univesity, Kolkata, West Bengal

Jai Prakash University, Chhapra, Bihar

Jaipur National University, Jaipur, Rajasthan

Jamia Milia Islamia University, New Delhi, Delhi

Jammu University, Jammu Tawi, Jammu and Kashmir

Jawaharlal Nehru Technological University, Anantpur, Andhra Pradesh

Jawaharlal Nehru University, New Delhi, Delhi

Jiwaji University, Gwalior, Madhya Pradesh

Kalyani University, Kalyani, West Bengal

Kannur University, Kannur, Kerala

Karanataka University, Dharwad, Karnataka

Kashmir University, Srinagar, Jammu and Kashmir

Kerala University, Thiruvananthapuram, Kerala

KIIT University, Bhubneswar, Odisha

Kolhan University, Chaibasa, West Singhbhum, Jharkhand

Kongunadu Arts & Science University, Coimbatore, Tamil Nadu

Kumaun University, Nainital, Uttrakhand

Kurukshetra University, Kurukshetra, Haryana

Lovely Professional University, Jalandhar, Punjab

Lucknow University, Lucknow, Uttar Pradesh

Maharishi Dayanand University, Rohtak, Haryana

Mahatma Jyotiba Phule Rohilkhand University, Bareilly, Uttar Pradesh

M. L Sukhadia University, Udaipur, Rajasthan

Maharaja Sayajirao University of Baroda, Vadodara, Gujarat

Madras University, Chennai, Tamil Nadu

Madurai Kamraj University, Madurai, Tamil Nadu

Magadh University, Bodh Gaya, Bihar

Maharaja Ranjit Singh Punjah Technical University, Bathinda, Punjab

Mahatama Gandhi University, Kottayam, Kerala

Manav Rachana International University, Faridabad, Haryana

Mangalore University, Mangalore, Karnataka

Manipur Univesity, Imphal, Manipur

Mannonmaniam Sundarnar University, Tirunelveli, Tamil Nadu

Mohanlal Sukhadia University, Udaipur, Rajasthan

Mother Teresa Women’s University, Kodaikanal, Tamil Nadu

Mumbai University, Mumbai, Maharashtra

Mysore Univesrity, Mysore, Karnataka

Nagaland University, Ballard, Nagaland

Nagpur University, Nagpur, Maharashtra

Nirma University, Ahmedabad, Gujarat

North Eastern Hill Univerity, Shillong, Meghalaya

North Maharashtra University, Jalgaon, Maharashtra

North Orissa University, Baripada, Bhuabaneswar, Odisha

Osmania University, Hyderabad, Telangana

Punjabi University, Patiala, Punjab

Patna University, Patna, Bihar

Periyar University, Salem, Tamil Nadu

PES University, Bangalore, Karnataka

Petroliam University, Dehradun, Uttarakhand

Pondicherry University, Kalapet, Puducherry

Poona University, Pune, Maharashtra

Presidency University, Kolkata, West Bengal

Pandit Ravishankar Shukla University, Raipur, Chhattisgarh

Punjab Agricultural University, Ludhiana, Punjab

Punjab Technical University, Jalandhar,Punjab

Punjabi University, Patalia, Punjab

Punjab University, Chandigarh

Rajasthan University, Jaipur, Rajasthan

Ranchi University, Ranchi, Jharkhand

Rani Durgawati Vishwavidyalaya, Jabalpur, Madhya Pradesh

Sri Krishnadevaraya University, Anantpur, Andhra University

Sambalpur University, Sambalpur, Odisha

Sant Gadge Baba Amravati University, Amravati, Maharashtra

Saurashtra University, Rajkot, Gujarat

SavitribaiPhule Pune University, Pune, Maharashtra

Shiv Nadar University, Dabri, Uttar Pradesh

Shivaji University, Kolhapur, Maharashtra

Shri Mata Vaishno Devi University, Jammu, Jammu and Kashmir

Sikkim University, Gangtok, Sikkim

Solapur University, Solapur, Maharashtra

Sri Krishnadevaraya University, Anantapur, Andhra University

Sri Sathya Sai Institute of Higher Learning, PrasanthiNilayam, Andhra Pradesh

SRM University, Chennai, Tamil Nadu

Swami Ramanand Teerth Marathwada University, Nanded, Maharashtra

Tezpur Univesity, Tezpur, Assam

Thapar University, Patiala, Punjab

The Rashtrasant Tukadoji Maharaj Nagpur University, Maharashtra

Tumkur University, Tumkur, Karnataka

University of Delhi, New Delhi, Delhi

University of Hyderabad, Hyderabad, Telangana

University of Petroleum and Energy Studies, Dehradun, Uttarakhand

Utkal University, Bhubaneswar, Odisha

Uttar Pradesh Technical University, Lucknow, Uttar Pradesh

Vikram University, Ujjain, Madhya Pradesh

Visva Bharati, Shantiniketan, West Bengal

VIT University, Vellore, Tamil Nadu

West Bengal University of Technology, Kolkata, West Bengal

YMCA University of Science & Technology, Faridabad, Haryana

List of College Users at IUAC (86)

Acharya Narendra Dev College, New Delhi, Delhi

Aditya Degree College, Visakhapatnam, Andhra Pradesh

Anand Mohan College, Kolkata, West Bengal

Armed Forces Medical College, Pune, Maharashtra

Arya College, Panipat, Haryana

Bareilly College, Bareilly, Uttar Pradesh

Beant College of Engineering & Technology, Gurdaspur, Punjab

Belonia College, Belonia, Tripura

Bharatiya Jain Sanghatana College, Pune, Maharashtra

Bhiwandi College, Mumbai, Maharashtra

BNN College, Bhiwandi, Maharashtra

CHM College, Ulhasnagar, Maharashtra

Christ Church College, Bengaluru, Karnataka

College of Engineering and Technology, Aligarh, Uttar Pradesh

DAV College, Amritsar, Punjab

DAV College, Kanpur, Uttar Pradesh

DAV College, Mumbai, Maharashtra

Dayalbagh Educational College, Agra, Uttar Pradesh

DBS College, Dehradun, Uttarakhand

Doodhsakhar Mahavidyalaya, Bidri, Maharashtra

Egra S.S.B. College, Midnapore, West Bengal

Farook College, Kozhokode, Kerala

GKSM Govt. College, Hoshiarpur, Punjab

Government Arts College for Men, Chennai, Tamil Nadu

Government College, Hissar, Haryana

Government College, Malappuram, Kerala

Government Holkar Science college, Indore, Madhya Pradesh

Govt. Arts College, Rajamundry, Andhra Pradesh

Govt. College, Ajmer, Rajasthan

GovernmentCollege, Kota, Rajasthan

Govt. College, Mahendragarh, Haryana

Goyalpara College, Goyalpara, West Bengal

Gurudas College, Kolkata, West Bengal

Jai Hind College, Mumbai, Maharashtra

Jain College, Naziabad, Bijnor, Uttar Pradesh

K.K.Jain College, Meerut, Uttar Pradesh

K.K.PG College, Muzafanagar, Uttar Pradesh

Kongunadu Arts & Science College, Coimbatore, Tamil Nadu

Koshi College, Khagaria

M.L.N. College

M.M.H.College, Ghaziabad

Mahila Degree College, Lucknow

Malviya Regional Engg. College, Jaipur

Marwari College, Ranchi

Mithibhai College, Mumbai

MMH College, Ghaziabad

Moti Lal Nehru college, Delhi

MR College, Vizianagram

Mukund Lal National College, Kurukshetra

National P.G. College, Lucknow

Nayagarh College, Nayagarh

Nizam College, Hyderabad

Nowrosjee Wadia College, Pune

NSAM College, Mangalore

Orissa Univ. of Agriculture & Tech., Bhubneshwar

Poorna Prajna College, Udipi

Presidency College, Chennai

Punjab Engineering College, Chandigarh

R.B.S. College, Agra

RD & DJ College, Munger

Regional Engineering College, Kurukshetra

RPG College, Ratnagiri

S.N.College, Kollam

S.S.Jain Subodh PG College, Jaipur

St. Xavier's Collage, Kolkata, West Bengal

S.V. College, Aligarh

Salipur College, Cuttack

School of Physical Sciences, Nanded

School of Tech. & Applied Sciences, Kottayam

SDM College, Ujire, Mysore

Sharanabasaveshwar College of Science, Gulbarga

Shree Kerala Verma College, Thrissur

Sri Bhuvanendra College, Karkala

St. Aloysius College, Jabalpur

St. Edmunds College, Shillong

St. Stephen's College, Delhi

St. Thomas College, Lucknow

St. Thomas College, Thrissur

Swami Shardhanand College, New Delhi

Swami Sukhdevanand Post Graduate College, Lucknow

University College of Science & Tech., Kolkata

University College, Kurukshetra

Vaish College, Rohtak

Vardhman College, Bijnor,

Varshney College, Agra

Yadava college, Madurai

List of IIT /IISER/NISER Users at IUAC (16)

Indian Institute of Science, Bangalore

Indian Institute of Technology (ISM), Dhanbad

Indian Institute of Technology, Chennai

Indian Institute of Technology, Guwahati

Indian Institute of Technology, Kanpur

Indian Institute of Technology, Kharagpur

Indian Institute of Technology, Mandi

Indian Institute of Technology, Mumbai

Indian Institute of Technology, New Delhi

Indian Institute of Technology, Roorkee

Indian Institute of Technology, Ropar

Indian Institute of Technology, Srinagar

IISER, Kolkatta

IISER, Pune

NISER, Bhubaneswar

IISER, Mohali

List of NIT Users at IUAC (9)

Malviya National Institute of Technology Jaipur

Maulana Azad national Institute of Technology, Bhopal

National Institute of Oceonography

National Institute of Technology Calicut

National Institute of Technology Srinagar

National Institute of Technology, Hamirpur

National Institute of Technology, Jalandhar

,National Institute of Technology Kurukshetra

National Institute of Technology, Rourkela

List of Foreign Users at IUAC (45)

ASUPAK, Taiwan

Brookhaven National Laboratory (BNL),USA

Centre for Superconductivity research, USA

CSNSM, Orsay Cedex, France

Flerov Laboratory of Nuclear Reaction, Russia

Genetic Inst. of Manufacturing Technology, Singapore

GSI, Germany

H.I.L. Warsaw, Poland

HIRS, Japan

Indiana University,USA

INFN-Legnaro National Laboratory, Italy

INSH & FISCA, Brazil

Institute of Electronics, Uzbekistan

Institute of Sciences, Israel

Japan Atomic Energy Agency, Vietnam

Joint Inst. of Nuclear Research, Dubna, Russia

Kiel University, Germany

LNL, Italy

Ludwig Maximillian University, Munich, Germany

Massachusetts Inst. of Technology, USA

Michigan State University (MSU),USA

MMS, Japan

N.V. University, USA

Nanocrystals Technology, USA

Nanyang Technological University, Singapore

National Institute of Radiological Science, Chiba, Japan

National University, Uzbekistan

NCSR, France

NEC,USA

Nelson Mendela Africian Institute of Science, Tanzaina

Oak Ridge National Laboratory, USA

RIKEN, Japan

St. Luciana University, USA

Stuttgart University, Germany

Syracuse University, New York, USA

Technical University, Darmstadt, Germany

The Joint Institute for Nuclear Research (JIN-R),Russia

University of Huddersfield, UK

University of Maryland, Maryland, USA

University of North Taxes, USA

University of Notre Dame, Notre Dame, USA

University of Saskatchewan, Canada

University of Chicago, Chicago USA

Wroglow University of Tech, Poland

Vienna University, Austria

List of Research Institute users at IUAC (37)

Bhabha Atomic Research Centre, Mumbai

C.E.E.R.I., Pilani

CCMB, Hyderabad

D.M.R.L., Hyderabad

Defence Laboratory, Jodhpur

Defence Research & Development Orgn., Dehradun

Harish Chandra Research Institute, Allahabad

I.G.C.A.R., Kalpakkam

Indian Association for the Cultivation of Science, Kolkata

Indian Institute of Space Science and Technology, IIST Thiruvananthapuram

Indian Space Research Organisation, Bangalore

INMAS, New Delhi

Institute of Basic Sciences, Agra

Institute of Materials Science, Bhubaneswar

Institute of Mineral & Materials Technology, Bhubneshwar

Institute of Physics, Bhubaneswar

Institute of Plasma Resarch, Ahmedabad

Institute of Science, Mumbai

ISCO, Bangalore

IUC-DAEF, Calcutta Centre, Kolkata

IUC-DAEF, Indore Centre, Indore

J.C.Bose Institute, Kolkata

Marveric Technology in Guwahati

National Academy of Science, Allahabad

National Physical Laboratory, New Delhi

NCCCM/BARC, Hyderabad

NISS, Bangalore

Physical Research of Laboratory, Ahmedabad

Raman Research Institute, Bangalore

RRCAT, Indore

Saha Institute of Nuclear Physics, Kolkata

Sant Longowal Institute of Engineering & Technology, Sangrur

SSPL, New Delhi

Tata Institute of Fundamental Research, Mumbai

Thapar Inst. Of Eng. & Technology, Patiala

VECC, Kolkata

Wadia Institute of Himalayan Geology, Dehradun

1984

1985

1986

1987

1988

1989

Early Years of NUCLEAR SCIENCE CENTRE,

which was renamed in June 2005 as INTER-UNIVERSITY ACCELERATOR CENTRE

अन्तर विश्वविद्यालय त्वरक केन्द्र
Inter-University Accelerator Centre
(विश्वविद्यालय अनुदान आयोग का स्वायत अनुसंधान केन्द्र)
(An Autonomous Inter-University Centre of UGC)
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