S.No.		Chapter Particulars Pag		Page No.
1.	AC	CCELERATOR		1
	1.1	PELLI	ETRON	1
		1.1.1	Operational Summary	1
		1.1.2	Maintenance and Development Activities	2
		1.1.3	Ion Source Activities	4
		1.1.4	Beam Pulsing System	5
		1.1.5	Development Activities	6
	1.2	LOWI	ENERGY ION BEAM FACILITY (LEIBF)	6
		1.2.1	Operation	7
		1.2.2	Maintenance	8
		1.2.3	Development	8
	1.3	PELLI	ETRON ACCELERATOR RBS-AMS SYSTEMS (PARAS	5) 8
		1.3.1	Operation	8
		1.3.2	Maintenance and Development	9
	1.4	DEVE	LOPMENT OF 50 KEV ION ACCELERATOR	9
2.	AC	CELER	ATOR AUGMENTATION PROGRAM	11
	2.1	LINAC	2	11
		2.1.1	Operation of Superconducting Linac & Delivery of Energised Beam for Nuclear Physics Experiments	11

	2.1.2	Developmental Activities in Linac	12
	2.1.3	Superconducting Niobium Resonators	13
	2.1.3.1	Performance of Indigenously built Resonators	13
	2.1.3.2	Niobium Low Beta Resonator	14
	2.1.3.3	Single Spoke Resonators	14
	2.1.3.4	Single & Multi Cell Cavities.	15
	2.1.3.5	Studies on the Superconducting Properties of Electron Beam Welded Niobium	15
	2.1.3.6	Facility Upgrade	16
2.2	HIGH	CURRENT INJECTOR (HCI)	16
	2.2.1	High Temperature Superconducting ECRIS-PKDELIS and Low Energy Beam Transport (LEBT)	16
	2.2.2	Radio Frequency Quadrupole Accelerator	21
	2.2.3	Design Validation of Prototype Drift Tube LINAC Resonator & High Power RF Test	24
	2.2.4	Beam Transport System	26
	2.2.4.1	Beam Optics of High Current Injector	26
	2.2.4.2	Multi Harmonic Buncher (MHB) Electronics for HCI	28
	2.2.4.3	Power Supply for HCI Steerer and Low Power Quadrupole Magnets	29
	2.2.4.4	Fabrication of Magnetic Quadrupoles for LEBT Section of HCI	29
2.3	CRYO	GENICS	29
	2.3.1	Cryogenic Facility	30
	2.3.2	LINAC Cryomodules	31

		2.3.3	Other Development Projects	31
		2.3.4	Instrumentation Developments	32
3.	RESI	EARCH	SUPPORT FACILITIES	34
	3.1	SUPPOI	RT LABORATORIES	34
		3.1.1	High Vacuum Laboratory	34
		3.1.1.1	Commissioning of Low Energy Ion Beam	34
		3.1.1.2	Installation of Experimental Chambers in LEIBF Hall	35
		3.1.1.3	Development of Electronic Modules	35
		3.1.2	Beam Transport System	36
		3.1.2.1	Scanning Magnet Power Supply	36
		3.1.2.2	Control Electronics for Piezo Actuator Based Phase Locking of SCQWR	36
		3.1.2.3	High Voltage Power Supply (2kV/5mA) for Neutron/Silicon Detector	37
		3.1.2.4	Development of Beam Line Selector Switch for LEIBF-II Facility	37
		3.1.2.5	Maintenance Activities	37
		3.1.2.5.1	Beam Transport System Maintenance	37
		3.1.2.5.2	Maintenance of Power Supplies/Instruments other than BTS	38
		3.1.3	Detector Laboratory	39
		3.1.3.1	Detector System for Fission Angular Distribution Studies in GPSC	39
		3.1.3.2	Detector Setup for HYRA Focal Plane	40
		3.1.3.3	Repair of Damaged MWPC in NAND & GPSC	40

3.1.3.4	Time of Flight Systems for NAND/GPSC	40
3.1.3.5	Testing of Resistive Anode Detectors from CATE (GSI)	40
3.1.3.6	Ballistic Deficit Correction in Resistive Strip Detector	41
3.1.3.7	Hybrid Preamplifiers for CsI & Silicon Detectors	41
3.1.4	Target Development Laboratory	41
3.1.5	RF & Electronics Laboratory	43
3.1.5.1	Status of PSD Electronics for NAND Array at IUAC	43
3.1.5.2	Voltage Divider Base for Photo Multiplier Tube (PMT) R4144	44
3.1.5.3	High Power Solid State Power Amplifier Development	44
3.1.5.4	Status Report of the Multi-Harmonic Buncher and Associated Jobs	44
3.1.5.5	Development of the Multi-harmonic buncher (MHB) for High Current Injector (HCI)	45
3.1.5.6	USB Interface for Control Knobs Hardware to PC	45
3.1.5.7	New Developments in the Control Scheme for Linac	45
3.1.5.8	Silicon Surface Barrier Detector Electronics Module:	46
3.1.5.9	Gamma Detector Amplifier	46
3.1.6	Computer and Communications	46
3.1.6.1	High Performance Computing Facility	47
3.1.6.2	IUAC LAN and Servers	47
3.1.6.3	New Generation Instrumentation & Acquisition Systems (NIAS)	48
3.1.7	Health Physics Laboratory	49
3.1.7.1	Radiation Shielding Door	49

3.1.7.2	Gamma Chamber GC-1200	50
3.1.7.3	Correlation Between Ion induced Defects and Luminescence Properties of $K_3Na(SO_4)_2$: Eu Nanophosphor	50
3.1.7.4	Luminescence Characteristics of $Ca_{1-x}Sr_xS$:Ce Nanophosphors	51
3.1.7.5	Luminescence Characteristics of Eu and Ti Doped LiNaF ₂ Phosphor	51
3.1.7.6	Argon Ions-induced Thermoluminescence Properties of $Ba_{0.12}Sr_{0.88}SO_4$ Phosphor	51
3.1.7.7	Nanocrystalline BaSO4:Eu for Dosimetry of Proton Beams	52
3.1.7.8	Thermoluminescence Studies of Tissue Equivalent Lithium Fluoride Nanophosphors	52
3.1.7.9	Thermoluminescence Characteristics of Gamma- irradiated $\text{Li}_2\text{B}_4\text{O}_7$:Cu Nanophosphor	53
3.1.7.10	Thermoluminescence Properties of Nanocrystalline K_2Ca_2 (SO ₄) ₃ :Eu Irradiated with Gamma-rays and Proton Beam	53
3.1.8	Data Support Laboratory	53
3.1.8.1	Upgradation of Data Acquisition Network Router	54
3.1.8.2	Fabrication of FPGA Based 8 Channel 4K CAMAC ADC Modules	54
3.1.8.3	Development of Data Acquisition System for Radiation Biology Facility	54
3.1.8.4	Development of Micro-controller based Stepper-motor controller	55
3.1.8.5	Development of NIM Modules for NAND Experimental Facility	55
3.1.8.6	Servicing and Maintenance	55

3.2 UTILITY SYSTEMS

55

		3.2.1	Electrical Group Activities	55
		3.2.1.1	Captive Power Installations	55
		3.2.1.2	Voltage Stabilizers	56
		3.2.1.3	UPS Installations	56
		3.2.1.4	Power Factor Compensation	56
		3.2.1.5	Communication Equipments	56
		3.2.1.6	Maintenance of Substation, Power & Lighting Installations of Office Complex & Residential Colony	56
		3.2.1.7	Energy Saving	56
		3.2.1.8	UPS Systems	56
		3.2.1.9	UPS Systems for 15UD Pelletron	57
		3.2.1.10	Backup Power to 15UD Pelletron	57
		3.2.1.11	Backup Power to HPC Centre	57
		3.2.1.12	Synchronization of DG Sets	57
		3.2.1.13	Electrical Energy Management Network	57
		3.2.2	Air Conditioning, Water System & Cooling Equipments	57
		3.2.3	Civil Works	59
		3.2.4	Compressed Air System & Material Handling Equipments	60
4.	EXPE	ERIME	NTAL FACILITIES IN BEAM HALL	61
	4.1	GENER & NEUT	AL PURPOSE SCATTERING CHAMBER (GPSC) FRON ARRAY FACILITY (NAND)	61
		4.1.1	Development Activities for Large Array of Neutron	61
		4.1.2	Neutron - Gamma Discrimination Using Digital Pulse Processing	63

4.2	GAM	MA DETECTOR ARRAY (GDA)	63
	4.2.1	Experiments and Detector Maintenance	64
4.3	HYBR HEAV	RID RECOIL MASS ANALYZER (HYRA) AND Y ION REACTION ANALYZER (HIRA)	64
4.4	MATE	CRIALS SCIENCE FACILITY	65
	4.4.1	Irradiation Chamber Maintenance	66
	4.4.2	Scanning Probe Microscope	66
	4.4.3	In-situ X-ray Diffractometer	66
	4.4.4	Plasma Based Systems for Thin Film Deposition	67
	4.4.5	Ball Milling System	67
	4.4.6	Field Emission Scanning Electron Microscope (FE-SEM)	67
	4.4.7	Online ERDA Set-up	67
	4.4.8	Status Report on Spectroscopy Facilities	67
	4.4.9	Materials Science: Offline Facilities	68
4.5	RADL	ATION BIOLOGY EXPERIMENTAL FACILITY	69
4.6	ATON	IIC & MOLECULAR PHYSICS FACILITY	69
	4.6.1	A Setup for Ion Energy Loss in the Wake Field of Thin Solid Foils	69
	4.6.2	Setup for Studying the Cross Link between Atomic and Nuclear Physics	71
	4.6.3	A Beam Line and an Experimental Setup in New LEIBF Dedicated to Ion-molecule Interaction Study	73
4.7	ACCE	LERATOR MASS SPECTROMETRY	73

5. RESEARCH ACTIVITIES

5.1	NUCL	EAR PHYSICS	75
	5.1.1	Saddle Point Shell Correction Energies from Pre-scission Neutron Multiplicities	75
	5.1.2	Evaporation Residue Spin Distribution for ³¹ P+ ¹⁷⁰ Er	77
	5.1.3	Modeling of Incomplete Fusion at $E_{Lab} \approx 4-8$ MeVA	78
	5.1.4	Search for Quasifission in Asymmetric Reaction Forming ²⁵⁰ Cf Compound System	79
	5.1.5	Study of Fission Fragment Angular Distribution for ¹⁹ F + ^{194, 196,198} Pt Reactions at Near and Above Barrier Energies.	81
	5.1.6	The Study of ${}^{12}C({}^{6}Li,d){}^{16}O*$ Reaction at 20 MeV in Relation to the ${}^{12}C(\alpha\gamma)$ Reaction	83
	5.1.7	First Measurement of GDR γ-rays from ¹⁹⁶ Hg in a Novel LaBr+NaI Spectrometer	84
	5.1.8	Evaporation Residue Cross-Section Measurements for ${}^{19}\text{F} + {}^{194, 196, 198}\text{Pt}$ Reactions	85
5.2 N	AATERIA	ALS SCIENCE	87
	5.2.1	In-situ Electrical Characterization of 100 MeV O ⁷⁺ ion Irradiated 200 GHz SiGe HBTs	87
	5.2.2	In-situ Study of Current Transport Across Pt/n-Si (100) Schottky Junction During 100 MeV Ni ⁺⁷ Ion Irradiation	88
	5.2.3	Formation of PbTe Layer by Ion Beam Induced Interface Mixing	89
	5.2.4	Ion Beam Mixing in Bi/Te Thin Film System	90
	5.2.5	SHI Irradiation Effects on Functionalization Properties of Well Aligned SWNTs	91
	5.2.6	Hydro-dynamics of Surface Patterning by Ion Beam Irradiation: an Interface Phenomenon	92

75

5.2.7	Experimental and Atomistic Simulations Studies of Effect of 350 keV Ar Ion Irradiation on Sandwiched Thin Metal Layer	94
5.2.8	Modifications of Silver-Silica Nanocomposite Films by Swift Heavy Ion Irradiation: Correlation between Surface Plasmon Resonance and Electronic Sputtering	94
5.2.9	Effect of 200 MeV Ag Ions on the Transport Property of YBCO/Ag Composite Thin Film	95
5.2.10	Swift Heavy Ion Irradiation on Ag:ZrO ₂ Nanocomposite Thin Films	96
5.2.11	Role of Defects and Interface Modification on the Ferromagnetism in the Nanostructured Pd	97
5.2.12	Thermoelectric Enhancement of PbTe Thin Film Using SHI Trradiation	98
5.2.13	Swift Heavy Ion Irradiation Induced Modifications in Optical Properties of Si-rich a-SiN _x :H Films	99
5.2.14	Effect of 120 MeV Ag ⁹⁺ Ion Irradiation on Structural and Optoelectronic Properties of ZnS/TiO ₂ Core-shell Quantum Dots	100
5.2.15	Formation of ZnO by Phase Splitting of $ZnMoO_4$ under Dense Electronic Excitation	101
5.2.16	Enhancement of LPG Sensing Properties in Nanocrystalline Zinc Oxide Thin Film by High Electronic Excitation	102
5.2.17	SHI Induced Modifications of $CdS-Bi_2S_3$ Nanocomposite Thin Film by Successive Ionic Layer Adsorption and Reaction (SILAR) Method	104
5.2.18	Effect of Swift Heavy Ion Irradiation on the Properties of Spray Pyrolytically Deposited Ti Doped In ₂ O ₃ Films	106
5.2.19	Swift Heavy Ion Provoked Structural and Electrical Properties in SnO_2 Thin Films	107
5.2.20	Softening of Phonons by Lattice Defects and Structural Strain in Swift Heavy Ion Irradiated Nanocrystalline Zinc Oxide Films	108

5.2.21	Investigations on 120 MeV Au ⁹⁺ Irradiated Praseodymium Incorporated ZnS/TiO ₂ Core-shell Nanostructures	109
5.2.22	Structural and Magnetic Properties of 100 MeV Ag ⁺⁷ Ion Irradiated Co Doped TiO ₂ Thin Films	110
5.2.23	Decomposition of Nanocrystalline Zinc Silicate Phase at the ZnO-Si Interface by Swift Heavy Ion Irradiation	111
5.2.24	Role of Doping in the SHI Induced Modifications of Optical Properties of Nanocrystalline Zinc Oxide Films	112
5.2.25	Conducting Nano-Channels in Induced Piezoelectric Polymeric Matrix Using Swift Heavy Ions and Subsequent Functionalization	113
5.2.26	Hetero-Epitaxial Growth of Si/SiO ₂ Using 100 MeV Ni ⁷⁺ Beam	114
5.2.27	Swift Heavy Ion Irradiation Investigations on Polyetheretherketone (PEEK)	115
5.2.28	Irradiation Induced Effects in MgO by X-ray Absorption Near-edge Structure Spectroscopy	116
5.2.29	Swift Heavy Ion Induced Modifications in NdNiO ₃ Thin Films Deposited on SrTiO ₃ Substrate	117
5.2.30	Effect of 200 MeV Ag Ion Irradiation on Multiferroic $GdMnO_3$ Thin Films	118
5.2.31	Low Temperature Dielectric Behaviour of 100 Mev O ⁷⁺ Irradiated NCO Terminated Liquid Crystalline Polyurathane	119
5.2.32	Rectifying Response of Schottky Devices Using ZnO-Nanorods Irradiated with 80-MeV Oxygen Ions	119
5.2.33	Effects of 30 and 60 MeV Boron Ion Irradiation on Electrical Characteristics of Bipolar Transistor	121
5.2.34	Influence of 175 MeV Nickel Ion and 75 MeV Boron Ion Irradiation on the I-V Characteristics of NPN RF Power Transistors	122

		5.2.35	A Comparison of 175 MeV Nickel and 75 MeV Boron Ion Irradiation Effects on Subthreshold Characteristics of N-Channel Depletion MOSFETs	123
	5.3	RADL	ATION BIOLOGY	125
		5.3.1	Study of Radiosensitivity of Human Cervical Cancer Cell Line Treated with Glucose Stabilized Gold Nanoparticle	125
		5.3.2	Role of PARP-1 in Cell Cycle Regulation of Human Cervical Epithelial Carcinoma (HeLa) Cells in Response to High LET Radiation ¹² C ⁶⁺	126
	5.4	АТОМ	IIC & MOLECULAR PHYSICS	126
		5.4.1	Ion Energy Loss in the Wake Field in Solid Foils	126
		5.4.2	Fully Stripped Ions in Nuclear Reaction	127
		5.4.3	A New Electron Capture Process	128
	5.5	ACCE	LERATOR MASS SPECTROMETRY	129
		5.5.1	¹⁰ Be in the Sediment Core from Central Indian Ocean Basin	129
6.		ACA	DEMIC ACTIVITIES	131
	6.1	PELLI	ETRON BEAM UTILIZATION BY USERS	131
		6.1.1	Pelletron Beam Time Utilization and Experiments Performed (April, 2011 to March, 2012)	131
		6.1.2	List of Users Family	133
	6.2	STUDE	ENTS' PROGRAMME	140
		6.2.1	B.Sc. Summer Programme	140
		6.2.2	M.Sc. Orientation Programme	140

	6.2.3	The PHD Teaching Programme	140
	6.2.4	Teaching Lab Activities	141
6.3	LIBRARY		141
6.4	ACAL	DEMIC ACTIVITIES HELD IN 2011-12	142
6.5	FORT	THCOMING EVENTS: 2012	143
6.6	LIST	OF PH.D AWARDEES	145
6.7	L	IST OF PUBLICATIONS	145
6.8	LIST	OF SEMINARS CONDUCTED IN THE YEAR – 2011-12	153
6.9	LIST (DF TECHNICAL REPORTS / TECHNICAL MEMOS (201	1-12) 155
APPENDIX I			158
APPENDIX II			164
APPENI	DIX III		168