

Department of Physics

Major Research Initiatives during the Academic Years 2012-13 to 2015-16

S. No.	Research Initiative	Academic Year
1.	Research on high energy density Li-ion batteries	2012-13
2.	Experimental aspects in Nuclear Astrophysics in collaboration with TIFR, Mumbai	2012-13
3.	Investigating the mathematical structure of pure Coulomb breakup with three charged particles in the final channel, with an aim to look for semi analytical solutions to a longstanding problem	2012-13
4.	Theoretical studies focusing on Electronic band structure and transport properties in AA and AB stacked bilayer Graphene nanostructure has been attempted as multilayer-graphene nanostructures possess tunable band gap and offer applications in nano-electronic devices	2013-14
5.	Nanostructure enabled high performance Supercapacitor	2013-14
6.	Establishment of research laboratory – Solar Photovoltaic	2013-14
7.	Establishment of research laboratory – Quantum Optics	2013-14
8.	Establishment of research laboratory – Radiation Detectors and Spectroscopy	2013-14
9.	Extension of the analytic theory of Coulomb breakup to include projectiles having ‘deformed structure’ – a very new and exciting development which has expanded the field of ‘light exotic nuclei’ to the ‘deformed medium mass’ region	2013-14
10.	<i>Holographic study of large-N thermal QCD at finite gauge coupling</i> (thereby from “M-theory” perspective)	2013-14
11.	Design of few-mode Erbium doped fiber amplifiers for SDM optical communication system	2013-14

12.	The electronic spectral and superconducting properties of Iron based superconductors thoroughly studies based on multi-orbital Hund's correlated many body Theoretical model approach as iron-based Superconductors are one of the promising material having potential technological applications	2014-15
13.	Investigating the idea of "magicity" in nuclei from a purely nuclear reaction perspective	2014-15
14.	Forbidden beta decay of fp shell nuclei and Theoretical direct WIMP detection rates for transitions to first excited state of ^{83}Kr	2014-15
15.	The tunable Josephson transport in superconducting double coupled quantum dots Josephson nano-junction has been theoretically analysed employing nonequilibrium many body Green's function approach. Recently nano-Josephson junctions find applications in quantum computers and nano-molecular electronics	2015-16
16.	Development of Hybrid Energy Storage Devices for Electric Vehicles	2015-16
17.	Growth and characterization of advanced scintillation crystals in collaboration with Technical Physics Division, BARC, Mumbai	2015-16
18.	Calculations on radiative capture cross sections with deformed projectiles.	2015-16
19.	Theoretical estimate of single and double beta-decay Q values among the triplet ^{96}Zr , ^{96}Nb and ^{96}Mo	2015-16
20.	Proposed reliable plasma modeling using inert gases	2014-16
21.	New analytical approach for studying electron-molecule scattering	2014-16