Research & Development Opportunities In Fusion Science & Technology

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National Fusion Programme (NFP)

Institute for Plasma Research, Bhat,
Gandhinagar 382 028, India

A list of R&D project ideas (seeds) generated from end user requirements are listed below. Please contact the proposer directly or contact NFP if you are interested in taking up any of the below listed projects. You may also propose R&D ideas (not listed below) which you think might be useful in the context of Fusion R&D.

Please note that these are NOT course projects for MTech/BTech students.

Board Of Research In Fusion Science & Technology

R&D Opportunities In Fusion Science & Technology

List Of Project Seeds Under Various Categories

Project No.	**Area**	**Extended title of the project**	**Name of the Proposer**	**Email Address**	**Phone**
BEAM-01	Beam Technology	Development of large area (~ 1 m dia, 0.5 m (w), 0.35 m (h)) alumina ceramic -	Arun Chakraborty	arunkc@ipr.res.in	9426703572
BEAM-02	Beam Technology	Development of transitions (Alumina - kovar - SS/ Copper) for the ceramic to metal joints of ~ 0.1 m	Arun Chakraborty	arunkc@ipr.res.in	9426703572
BEAM-03	Beam Technology	Development of vacuum grade FRP-Metal cast transitions of large diameters (~ 1.2 m)	Arun Chakraborty	arunkc@ipr.res.in	9426703572
BEAM-04	Beam Technology	Development of welded transitions between SS 304 l & OFC or Cu-Cr-Zr in varying geometries - exploration of explosive bonding and friction welding - comparative assessment of feasibilities	Arun Chakraborty	arunkc@ipr.res.in	9426703572
BEAM-05	Beam Technology	Development of alternate bonding technologies for large area interfaces involving dissimilar materials (eg. SS - Cu-cr-Zr/ OFC)	Arun Chakraborty	arunkc@ipr.res.in	9426703572

BEAM-06	Beam Technology	Feasibility study for large area vacuum/controlled environment furnace brazing for complex geometries (eg. Chevron baffled cryo pumps)	Arun Chakraborty	arunkc@ipr.res.in	9426703572
BEAM-07	Beam Technology	Feasibility assessment (through actual trials) of effectiveness of spinning operation in realizing complex shapes used in high voltage stress shields	Arun Chakraborty	arunkc@ipr.res.in	9426703572
BEAM-08	Beam Technology	Design and implementation of a magnetically coupled drive for fast movement mechanism under vacuum	Arun Chakraborty	arunkc@ipr.res.in	9426703572
BEAM-09	Beam Technology	Development of multilayered electro-deposition	Arun Chakraborty	arunkc@ipr.res.in	9426703572
CRYO-01	Cryogenics	Design and development of "Demountable joints for the Cryogenic Process Transfer Lines".	Manojkumar Gupta	jmk@ipr.res.in	9426029533
CRYO-02	Cryogenics	Design and development of "Liquid nitrogen booster pumps	Manojkumar Gupta	jmk@ipr.res.in	9426029533
CRYO-03	Cryogenics	Conductive Epoxy Joining Technology for the "Cryogenic Temperature Sensors with the Cryogenic Surface" without welding and brazing.	Manojkumar Gupta	jmk@ipr.res.in	9426029533
CRYO-04	Cryogenics	Design and development of "Impeller of Cold Circulator".	Manojkumar Gupta	jmk@ipr.res.in	9426029533
CRYO-05	Cryogenics	Demountable Cryogenic seals at 77 K and 4.2 K Temperature	Rajiv Sharma	rajivs@ipr.res.in	9426365000
CRYO-06	Cryogenics	LN2 Pump for lab experiments/LN2 transfer purpose	Rajiv Sharma	rajivs@ipr.res.in	9426365001
CRYO-07	Cryogenics	Liquid Helium circulator (Cold pump)	N C Gupta	ncgupta@ipr.res.in	079-23962142

ELE-01	Electrical	DSP based digital regulated multi pulse single and dual polarity rectifiers	Balakrishnan V.	balakris@ipr.res.in	9824020827
ELE-02	Electrical	High current static switches~ 20 kA	Balakrishnan V.	balakris@ipr.res.in	9824020827
ELE-03	Electrical	Fast make vacuum switches~10 to 20 m sec, Continuous duty	Balakrishnan V.	balakris@ipr.res.in	9824020827
ELE-04	Electrical	Explosive triggered high current dc switches for quench protection ~ 10 kA continuous duty	Balakrishnan V.	balakris@ipr.res.in	9824020827
ELE-05	Electrical	High voltage SMPS 50-100 KV	Balakrishnan V.	balakris@ipr.res.in	9824020827
ELE-06	Electrical	Evaluation study design and analysis of 200 MWw fly wheel Motor-generator system	Balakrishnan V.	balakris@ipr.res.in	9824020827
ELE-07	Electrical	Digital Firing Board for Multi-pulse Single & Dual Polarity Rectifiers	A. Varadharajulu	avraju@ipr.res.in	9879531275
ELE-08	Electrical	High Power Density Rectifier Arm Assembly – Thermo-mechanical evaluation study & prototyping	A. Varadharajulu	avraju@ipr.res.in	9879531275
ELE-09	Electrical	Short duty (10-second), Solid State, High Current DC Switch	A. Varadharajulu	avraju@ipr.res.in	9879531275
ELE-10	Electrical	Continuous duty, High Speed (few 10’s of m-sec), Mechanical, High Current DC Make Switch	A. Varadharajulu	avraju@ipr.res.in	9879531275
ELE-11	Electrical	Precision, High Current, Isolated DC Transducer	A. Varadharajulu	avraju@ipr.res.in	9879531275

ELE-12	Electrical	Continuous duty, Motorized Operation, High Current DC Isolators	A. Varadharajulu	avraju@ipr.res.in	9879531275
ELE-13	Electrical	Explosive Triggered, High Current DC Switch	A. Varadharajulu	avraju@ipr.res.in	9879531275
ELE-14	Power supply	High frequency (upto 50kHz) high voltage power source	G. Ravi	gravi@ipr.res.in	9662872455
ELE-15	Power supply	IGBT based 300 kW power source development	S. K. Nema	nema@ipr.res.in	9427632948
ELE-16	Power supply	Development of 1kV / 500 kHz (variable) Asymmetric Bipolar Pulsed Power source for Oxidation studies	Alphonsa Joseph	alphonsa@ipr.res.in	9825493776
ELEC-01	Electronics	Wireless Data communication	N. C. Patel	ncpatel@ipr.res.in	9428806554
ELEC-02	Electronics	Universal Interface for Digitizer/" Programmable Interface for instrument".	Chhaya Chavda	chhaya@ipr.res.in	9825734489
ELEC-03	Electronics	Universal Interlock Control system	Chhaya Chavda	chhaya@ipr.res.in	9825734489
ELEC-04	Electronics	Optical Digitizer	Chhaya Chavda	chhaya@ipr.res.in	9825734489
ELEC-05	Electronics	Fast response Vacuum Gauge - To measure real time pressure in Tokamak Vacuum vessel	S B Bhatt	sbbhatt@ipr.res.in	9825407710
ELEC-06	Electronics	FPGA based standalone tunable Fuzzy Logic Controller module	J. Govindrajan	govind@ipr.res.in	9723537745

ELEC-07	Electronics	Analog to Information Converter using Compressive sensing technique	J. Govindrajan	govind@ipr.res.in	9723537745
ELEC-08	Electronics	Single Sensor High Resolution Infrared Cameras by Compressive sensing	J. Govindrajan	govind@ipr.res.in	9723537745
ELEC-09	Electronics	Fast Wavelet Transform module for online analysis	J. Govindrajan	govind@ipr.res.in	9723537745
MAT-01	Material	Experimental study to measure the K_{eff} of solid breeder pebble bed as a function of wall temperature	Paritosh Chaudhuri	paritosh@ipr.res.in	9427805527
MAT-02	Material	Study of Interfacial heat transfer between the pebble bed and wall	Paritosh Chaudhuri	paritosh@ipr.res.in	9427805527
MAT-03	Material	Hydrogen isotope permeation through structural materials.	Amit Sircar	asircar@ipr.res.in	9427358887
MAT-04	Material	Development of Tritium Permeation barrier coatings.	Amit Sircar	asircar@ipr.res.in	9427358887
MAT-05	Material	3D numerical simulation for MHD flow and heat transfer: Analytical expressions are not valid for real experimental condition.	Rajendra Bhattacharya	rbhatac@ipr.res.in	9099147816
MAT-06	Material	Design and running of simple liquid metal loop: MHD code validation, addressing various issues for working with liquid metal (material compatibility, safety issues etc.)	Rajendra Bhattacharya	rbhatac@ipr.res.in	9099147816
MAT-07	Material	Measurement of Important physical parameters at high temperatures: Experimental measurements (pressure, velocity profile, flow rate etc.) become rather challenging at high temperature (> 400 deg C) because of the non-availability of instruments.	Rajendra Bhattacharya	rbhatac@ipr.res.in	9099147816

MAT-08	Material	Development of high temp. compatible vacuum stirrer for moltel lead corrosion studies	Nirav Jamnapara	nirav@ipr.res.in	9898095203
MAT-09	Material	Development & optimization of hot dip Aluminizing process for coating on FM Steels	Nirav Jamnapara	nirav@ipr.res.in	9898095203
MAT-10	Material	Development of a high temp. contact angle measurement setup for liquid Al on steel	Nirav Jamnapara	nirav@ipr.res.in	9898095203
MAT-11	Material	Silicon carbide coating on graphite for tokamak limiter.	S B Bhatt	sbbhatt@ipr.res.in	9825407710
MAT-12	Coatings	High temp. wettability system development for aluminized coatings	Nirav Jamnapara	nirav@ipr.res.in	9898095203
MAT-13	Coatings	Hot dip aluminizing process optimization for 9Cr-1Mo steels	Nirav Jamnapara	nirav@ipr.res.in	9898095203
MAT-14	Coatings	Development of atmosphere-vacuum-atmosphere inline processing system for metallic coatings on steel sheets	A. Satyaprasad	asprasad@ipr.res.in	9426032609
MAT-15	Corrosion	Development of High temperature compatible vacuum stirrer for molten lead corrosion studies	Nirav Jamnapara	nirav@ipr.res.in	9898095203
MECH-01	Environment & Safety	Design & development of scrubber to remove metallic vapors from exhaust	S. K. Nema	nema@ipr.res.in	9427632948
MECH-02	Mechanical	Development of 3 to 4 DOF articulated arm for in-vessel remote maintenance	Balakrishnan V.	balakris@ipr.res.in	9824020827
MECH-03	TBM	Pump for liquid metal	Gautam Vadolia	gautamv@ipr.res.in	9427010832

MECH-04	TBM	Heat Exchanger for liquid metal	Gautam vadolia	gautamv@ipr.res.in	9427010832
MOD-01	Material	Numerical program to be developed based on the discrete element method (DEM) to simulate the phenomena of the mechanical deformation of the pebble bed.	Paritosh Chaudhuri	paritosh@ipr.res.in	9427805527
MOD-02	Material	Modeling of tritium diffusion inventory in Ceramic pebbles.	Amit Sircar	asircar@ipr.res.in	9427358887
MOD-03	Material	Neutronic Design studies for Solid breeder blanket of Indian DEMO.	Chandan Danani	chandan@ipr.res.in	9879603592
MOD-04	Material	Neutronic analysis of Lead-Lithium Cooled Ceramic Breeder (LLCB)	Chandan Danani	chandan@ipr.res.in	9879603592
MOD-05	Modelling	Multiphysics modelling of non-transferred plasma torch which combines CFD, EM and Thermal Analyses	G. Ravi	gravi@ipr.res.in	9662872455
MOD-06	Material	TBM using the deterministic tool ATTILA.	Chandan Danani	chandan@ipr.res.in	9879603592
MOD-07	Material	Calculation of Dose-rates on various components in the Test Blanket Module (TBM) Ancillary Equipment Unit (AEU) area using IGSHIELD code.	Chandan Danani	chandan@ipr.res.in	9879603592
MOD-08	Material	Neutronic design of the shield module of LLCB TBM.	Chandan Danani	chandan@ipr.res.in	9879603592
MOD-09	Material	Optimization of the blanket thickness of Indian DEMO.	Chandan Danani	chandan@ipr.res.in	9879603592
MOD-10	Material	Estimation of the radioactive waste and its classification for Indian DEMO blanket using EASY-2007.	Chandan Danani	chandan@ipr.res.in	9879603592

MOD-11	Material	Thermo-mechanical performance of breeder pebble beds	Paritosh Chaudhuri	paritosh@ipr.res.in	9427805527
MOD-12	Material	Study & analysis of creep deformation rate for the pebble bed thermo-mechanics.	Paritosh Chaudhuri	paritosh@ipr.res.in	9427805527
MOD-13	Material	An FEM model to be developed to predict the behavior of pebbles at high temperature under compressive loads.	Paritosh Chaudhuri	paritosh@ipr.res.in	9427805527
MOD-14	Material	FEM approach needs to simulate interactions between different deformation dominated regions and among different elements.	Paritosh Chaudhuri	paritosh@ipr.res.in	9427805527
OM-01	Opto-Mechanical	Design of an imaging visible spectrometer optimized for a selected wavelength region, using optical (ray tracing and diffraction grating) codes.	Ranjana Manchanda	mranjana@ipr.res.in	9898776127
OM-02	Opto-Mechanical	Development and fabrication of optical fiber accessories, like miniature collimating beam probe, interference filters (broad band and narrow band) and neutral density filters of different sizes and suitable opto-mechanical components.	Ranjana Manchanda	mranjana@ipr.res.in	9898776127
OM-03	Opto-Mechanical	Development and design of vacuum compatible manual and computer controlled high precision opto-mechanical components for plasma diagnostics	Santanu Banerjee	mranjana@ipr.res.in	9898776127
RF-01	RF & MW	Development of High Power Vacuum Tubes – Tetrode/Triode – Feasibility Study	Raj Singh	raj@ipr.res.in	9426353863
RF-02	RF & MW	Development of Dummy Load	Raj Singh	raj@ipr.res.in	9426353863
RF-03	RF & MW	Setting High Power Testing Facility for CW Operation	Raj Singh	raj@ipr.res.in	9426353863

RF-04	RF & MW	RF Measurements	Raj Singh	raj@ipr.res.in	9426353863
RF-05	RF & MW	Impedance Transformers	Raj Singh	raj@ipr.res.in	9426353863
RF-06	RF & MW	MW level high power combiner/splitter (10-100 MHz)	Sanjay Kulkarni	kulkarni@ipr.res.in	9879505122
RF-07	RF & MW	High power RF generator cavity: simulation, design, fabrication and testing at IPR	Sanjay Kulkarni	kulkarni@ipr.res.in	9879505122
RF-08	RF & MW	Motorized 9 inch 500 kW RF Co-axial switch	Sanjay Kulkarni	kulkarni@ipr.res.in	9879505122
RF-09	RF & MW	MW level high power RF dummy load	Sanjay Kulkarni	kulkarni@ipr.res.in	9879505122
RF-10	RF & MW	MW level RF hybrid coupler	Sanjay Kulkarni	kulkarni@ipr.res.in	9879505122
RF-11	RF & MW	1-2 kW level solid state RF amplifier (10-100 MHz)	Sanjay Kulkarni	kulkarni@ipr.res.in	9879505122
RF-12	RF & MW	High power solid state crowbar	Sanjay Kulkarni	kulkarni@ipr.res.in	9879505122
RF-13	RF & MW	High power solid state switch	Sanjay Kulkarni	kulkarni@ipr.res.in	9879505122
RF-14	RF & MW	1x32 way RF Splitter	Harsha Machchhar	harsha@ipr.res.in	9427051106

RF-15	RF & MW	High Voltage Capacitor	Harsha Machchhar	harsha@ipr.res.in	9427051106
RF-16	RF & MW	Solid State Low Power Amplifier	Harsha Machchhar	harsha@ipr.res.in	9427051106
VAC-01	Vacuum Technology	UHV Pumping Modules For Effective Maintenance of Fusion Devices - for managing loads and maintaining vacuum during non-operating time with low power consumption.	S B Bhatt	sbbhatt@ipr.res.in	9825407710

NFP Contact Details

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