

Present Thrust Area in the Field of Applied Superconductivity and Cryogenics in India

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Abstract— Major activity in the field of applied superconductivity and cryogenics in India are primarily confined to Department of Atomic Energy (DAE) and Indian Space Research Organization (ISRO). Indian space agency continues its activity on development of cryogenic engine/ semi-cryogenic engine at 20 K for the third stage of space launch vehicle. It is credited with recent success of launching Chandrayaan II by its own cryogenic engine CE-20 with a thrust of 200 kN. Department of Atomic Energy is focused on the application of RF cavity and high field magnet for advanced accelerator and fusion programme. Superconducting Cyclotron at VECC, Kolkata and Steady State Superconducting Tokamak at Institute of Plasma Research, Gandhinagar is based on LTS magnet. India is also contributing for ITER programme regarding the design, development and supply of complex and compact cryogen distribution line.

Superconducting Linear Accelerator at TIFR, Mumbai and at IUAC, Delhi works by using a series of low-frequency quarter-wave RF cavity operating at 4.2 K. Elliptical high-frequency RF superconducting cavity for proton and electron accelerator operating at 2 K is under development for spallation neutron source and RIB facility at a number of institutes under DAE. Recently Govt. of India has taken initiative on Indigenous development of 1.5 Tesla MRI under the banner of “Make in India”. Small scale feasibility study with HTS on Superconductivity for power application is being pursued at various academic institutes and scientific laboratories. This talk will give a brief overview of the present status and future plan on the above-mentioned project.

Keywords (Index Terms) — Cryogenics, space applications, rf-cavity, high-field magnet, accelerator, fusion, HTS, power applications.

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