

a computer program has been developed for this purpose. This program is also used to decide the ratings of resonant network components and inverter. The inverter is developed using IGBT modules. The supply is protected against fault conditions. The power supply has many advantages to encourage its use in future; it also has some limitations such as, load dependent characteristics that do not permit very wide load variations and high circulating energy in the resonant network.

The power supply has been tested and used for the mapping of prototype Indus-2 quadrupole magnet.

Electron Gun for Cherenkov FEL

A collaborative project between the Department of Physics, University of Pune and CAT, which envisage development of a Cherenkov Free Electron Laser has been approved by BRNS. Under this project CAT has to develop and supply an electron gun with associated power supplies and vacuum system to Pune University. Recently, Director CAT formally handed over this electron gun facility to Dr. V B Asgekar of Pune University.

The triode electron gun consists of LaB₆ cathode emitter, indirectly heated by a pancaked Tungsten filament, beam forming electrode, non-intercepting grid or modulator anode and accelerating anode. The gun is designed keeping in mind the high temperature of the electrodes during operation. These electrodes are housed inside a ceramic tube, which acts as an isolator. Electron gun is assembled with a water-

cooled Faraday cup which has an aperture to length ratio of 1:8 and a low Z graphite, as the base material for negligible secondary electron and low X-ray emission. The vacuum system comprises of sputter ion pump (140 lit/sec) and sorption pump, thus enabling a clean dry system. It produces a vacuum of 1×10^{-6} Pa.

The power supply consists of a 20kHz inverter, which drives the filament, bombarder and modulator through a 45kV isolation transformer. The cathode supply is a simple Cockroft-Walton type doubler circuit driven by 230 V to 26 kV 50 Hz transformer. The input is varied to get 40 kV DC. A pulse transformer accomplishes the grid drive. The current at the Faraday cup is monitored by directly terminating the standard RG58 cable at scope with a 50Ω termination.

The electrode configuration is optimised using the computer program EGUN. The perveance and emittance of the gun are 0.07 μ perv and 14 π mm.mrad respectively. The radius of the emergent electron beam is 1.6 mm in the down flange region, for injection into the accelerating column.

The present model is a improved model of electron gun reported in Newsletter (Year-6, No.1, Jan-June 1993). The present gun delivers 500 mA current pulses at 40 kV, with pulse duration of 2 μ sec. The repetition rate of pulses can be varied from 1 to 100Hz. Dark currents are 30 nano amps for negative bias to the modulating anode.

INFRASTRUCTURAL DEVELOPMENT

Construction of Indus-2 Building

Construction work of Indus-2 building has been spilt in two phases. Phase-1 consists of the S R S ring and transport line-3, i.e. radiation shielded structure. The phase-2 consists of experimental hall & users labs. The Phase-1 is nearing completion.

The building includes an annular ring with 1.5 m thick outer wall and 0.6 m inner wall. The overall diameter of the ring is 63m. The civil works include provision of beam line pipe embedded pipes (EP's), accurate magnet foundation EP's, which are placed to a very high accuracy (± 3 mm) and checked using electronic theodolite. Concrete for radiation shielding walls have been placed at controlled temperature of $22 \pm 1^\circ\text{C}$. Special care has to be taken for this, since the ambient temperature in this region goes as high as 46°C during summer. Also special precautions have been taken while placement of concrete to avoid subsequent radiation leakage. This has been accomplished by providing only 'Z' shaped opening and also by

Cover: Birds eye view of Indus-2 ring, presently under construction at CAT, Indore

staggering the construction joints.

Properties of concrete as shielding material are utilised in two ways, as a structural member to support radiation shielded slab as well as for supporting EOT cranes for SRS ring & experimental hall. Conventionally steel girders are



Radiation shielding walls of Indus-2 building. In the center is the magnet foundation, also seen at the middle is junction of Indus-2 ring and transport Line-3.