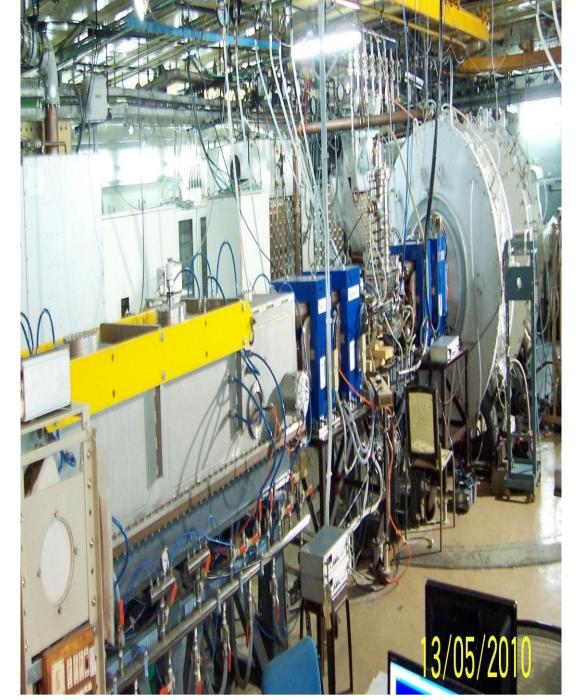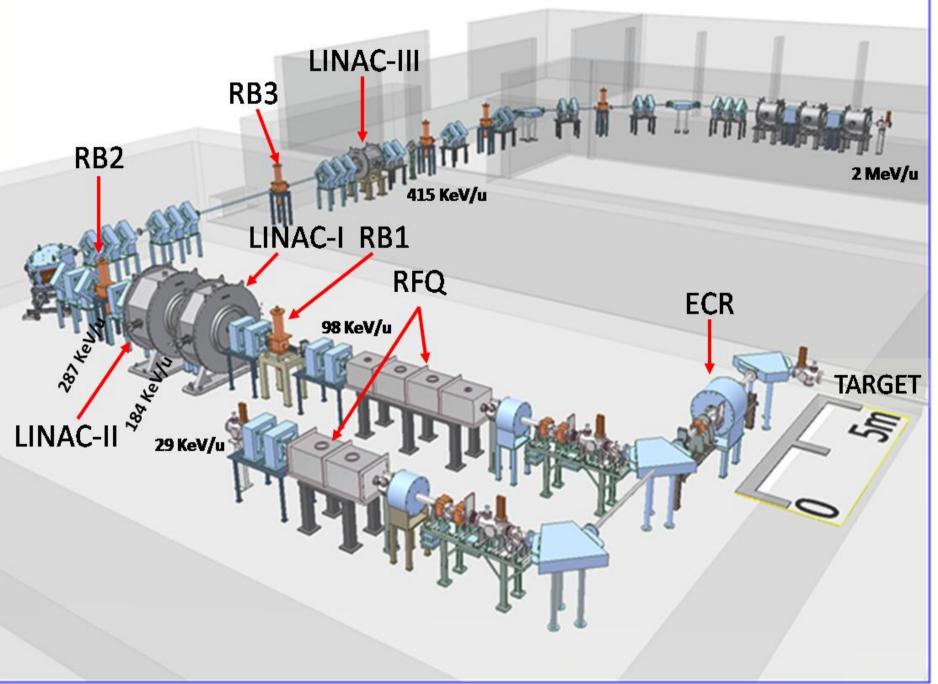# RF DISTRIBUTION AND CONTROL SYSTEM FOR ACCELERATORS OF THE VEC-RIB FACILITY
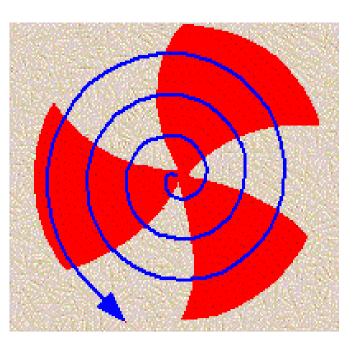
H. K. Pandey, T. K. Mandi, D.P. Dutta, S. Basak, A. Chakrabarti,
Variable Energy Cyclotron Centre, 1/AF Bidhan Nagar, Kolkata-64, India
K. P. Ray, SAMEER, IIT campus, Powai, Mumbai-76, India
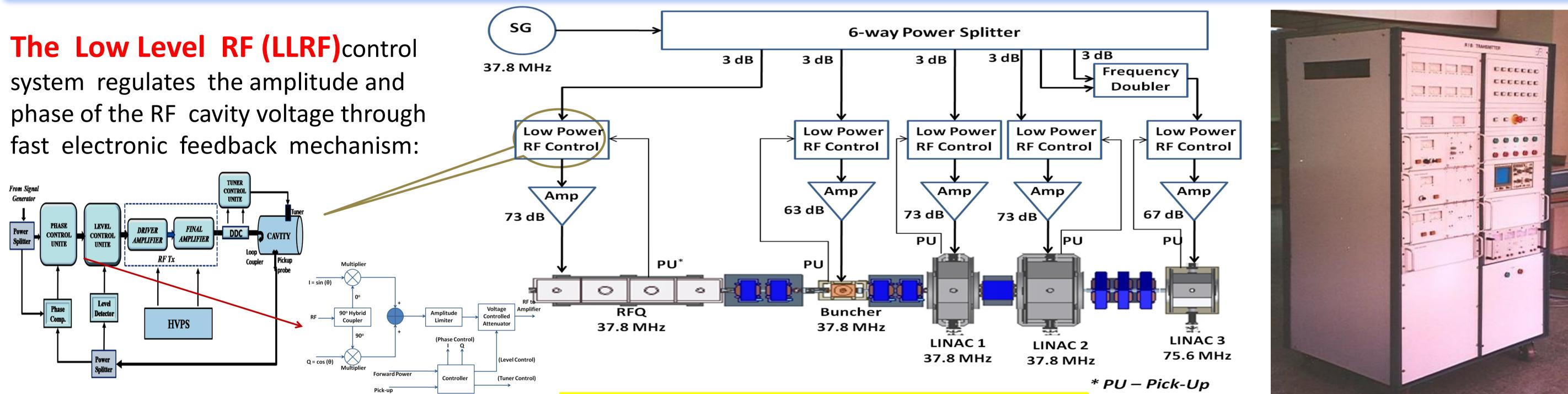A. Kumar, SAMEER, Sec-V, Bidhan Nagar, Kolkata-64, India

INTRODUCTION

ISOL type Rare Isotope Beam Facility is presently under construction at VECC Kolkata, India. K=130 room temperature Cyclotron. This has several heavy ion linear accelerators like RFQ, two IH-LINACs and one buncher cavity. All the cavities have separate RF power amplifiers with proper amplitude, phase and resonance frequency tuning and control system for efficient and stable operation. An embedded controller based data acquisition and processing system is being used for control and local/remote operation.

RF DISTRIBUTION SYSTEM

The RF system of VEC-RIB facility at present consists of a RFQ , 3 Linacs and 3 re-bunchers. The RFQ, first re-buncher and first 2 IH Linacs operate at fundamental frequency of 37.8 MHz, while third Linac and other 2 re-bunchers have designed for the second harmonic at 75.6 MHz.
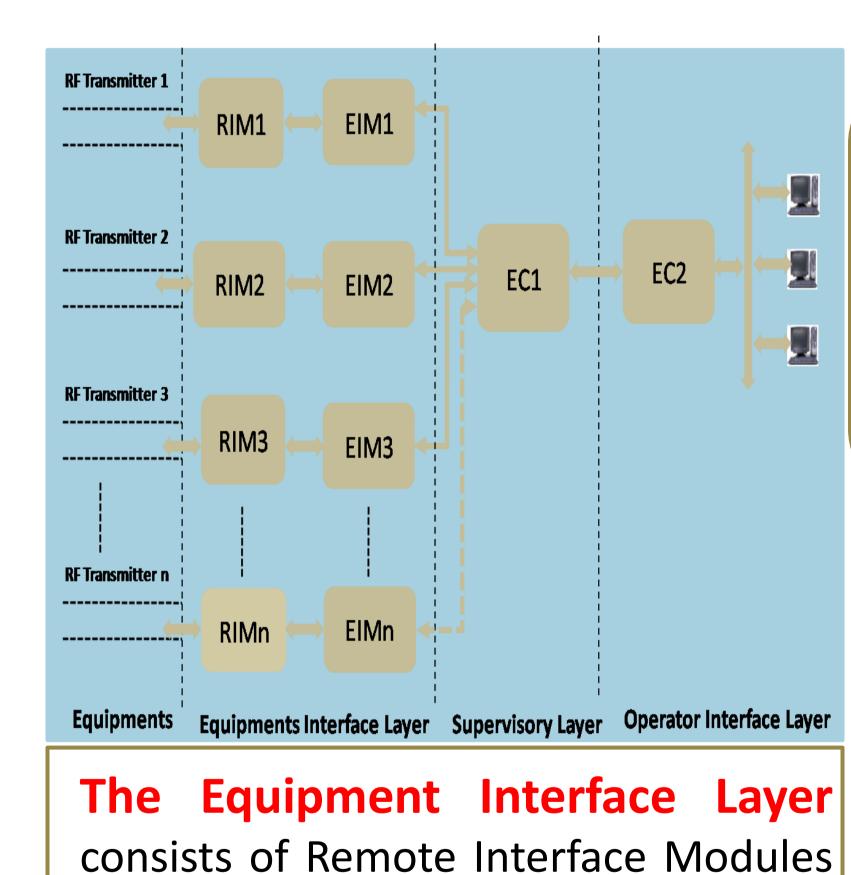
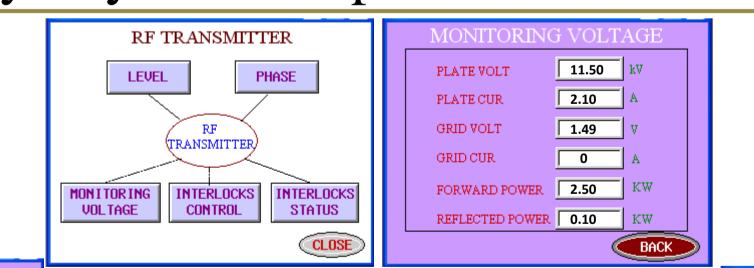The Low Level RF (LLRF) control system regulates the amplitude and phase of the RF cavity voltage through fast electronic feedback mechanism:
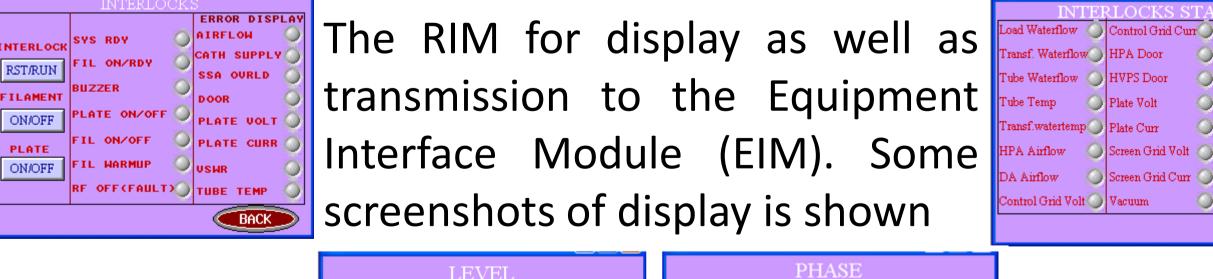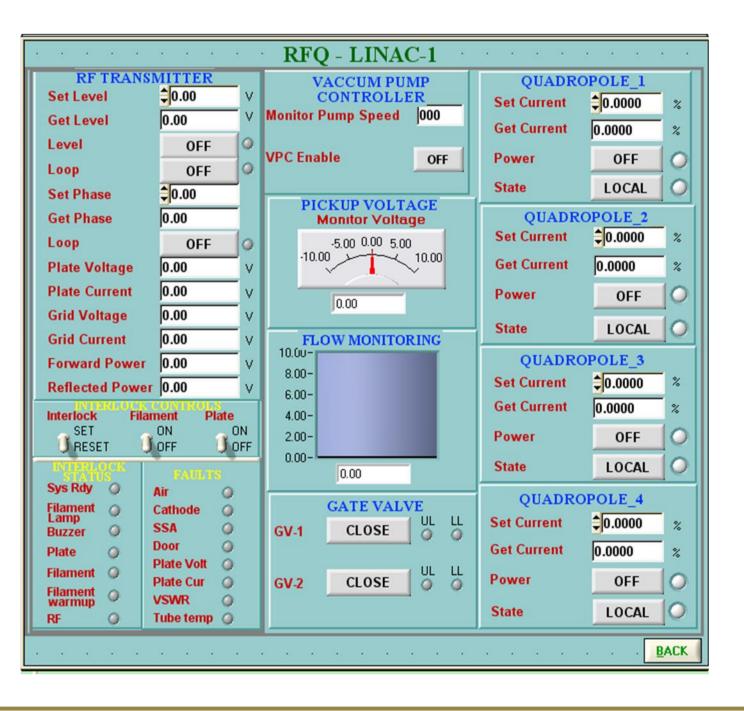

REMOTE CONTROL FOR RF SYSTEM

The remote control system is designed to control and monitor all parameters for the RIB beam line components including the RF transmitters at RIB Facility. The data acquisition and control system has a Three layered design Equipment Interface Layer, Supervisory Layer and Operator Interface Layer.

The Equipment Interface Layer consists of Remote Interface Modules (RIM) and Equipment Interface Modules (EIM). The main controller used in RIM is 32-bit LPC 2478 ARM7TDMI with analog/digital front-end electronics and RS232 line driver with touch-screen display. RIM is directly connected to controller for the RF transmitters. The local controller of the RF transmitter is equipped with 8 bit microcontroller, relays, buffers etc.

The RIM for display as well as transmission to the Equipment Interface Module (EIM). Some screenshots of display is shown

The RF distribution scheme and a remote control system for the RF transmitters has been tested and further tests and refinements are in progress. The present low level RF control system for the RF transmitters are described. The design of the LLRF system is being improved to IQ based LLRF control
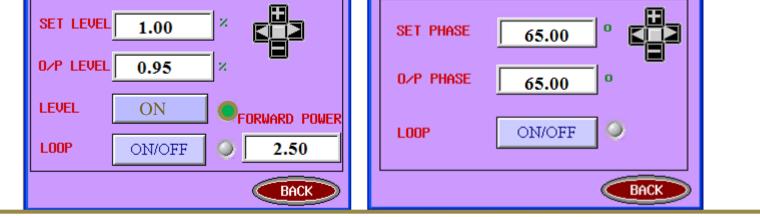
The Supervisory layer has been realised using Embedded Controllers (EC1) designed around Single Board Computer (SBC) with Embedded XP operating system. This controller, interfaced with EIMs through fiber optic cables, performs supervisory task of continuously sending command and acquiring data from lower level EIMs and reporting to the operator interface layer as and when requested. The EC1 has higher priority as compared to the EIMs.

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