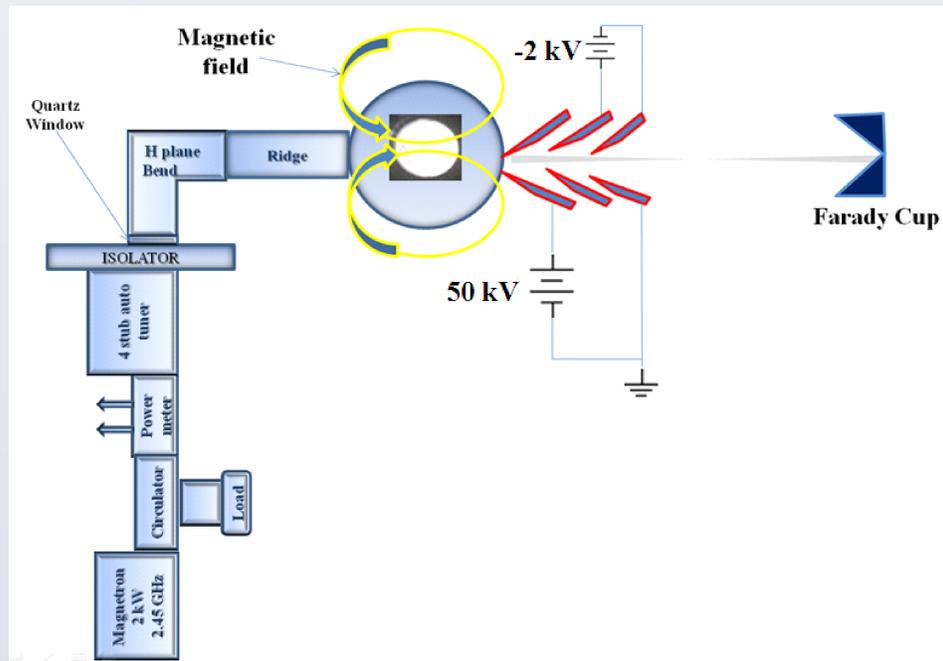


# Electron Cyclotron Resonance Ion Source Control System

H. M. Kewlani\*, P. Roychowdhury, D.P. Chakravarthy, L. Mishra, S.H. Gharat and K.C.Mittal  
Accelerator & Pulse Power Division, BARC, Mumbai

## Abstract

ECR Ion source control system is computer based control system. Main components of ECR ion source are microwave generation, plasma chamber, solenoid magnets and power supplies, extraction electrodes and power supplies, beam measuring device and vacuum system. All the electronics devices have their built in microprocessor base electronic interface, which can be remotely accessed by serial or ethernet link. Two ethernet to four port serial converter are used to extend serial port of the computer. Serial interface of all the devices are connected to the extended serial ports of the computer. Serial link of high voltage power supplies have provided optical isolation using serial to optical converter to overcome EMI and EMC problems. Software has been developed in house for remote operation of the ECR ion source.

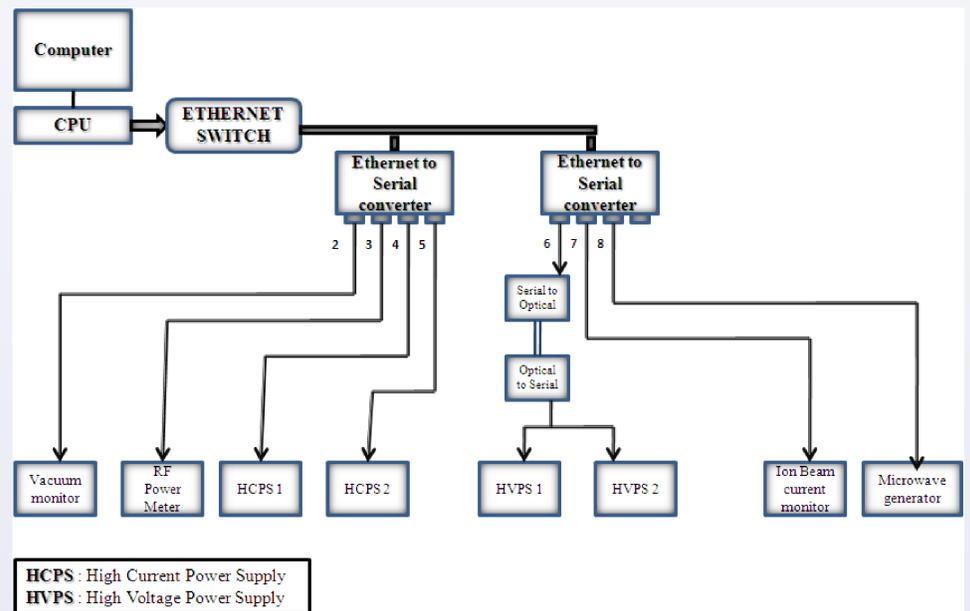


## Introduction

An ECR proton ion source has been developed for the Low Energy High Intensity Proton Accelerator (LEHIPA)[1]. The ion beam current of 42 mA (unanalyzed) has been extracted at a beam energy of 40 keV. The three electrode extraction geometry has been used for ion extraction. For reliable, stable and long time operations of the ion source it is mandatory to monitor forward and reflected microwave power, gas pressure, magnetic field and the beam parameters. ECR ion source is sub divided in to microwave section, solenoid coil and its power supplies, high voltage power supplies, vacuum system and beam measuring device (Faraday cup). Remote operation of all section has been done using computer. Detailed control system is discussed in control system architecture.



## Control system architecture



HCPS : High Current Power Supply  
HVPS : High Voltage Power Supply

Control system of ECR ion source is computer based control system. Control system architecture is shown in above figure. Industrial ethernet switch MOXA EDS208 [2] is connected to the computer. Two MOXA 5450I ethernet to 4 port serial converter is used to extend the serial port of the computer via ethernet switch.

## Control system software:

ECR control system is a computer based control system. Graphic user interface can be developed in any platform like QT, JAVA.

## Conclusion

ECR ion source control system has been designed and developed. Control system for the ECR ion source beam line is under development.

## Acknowledgement

The author wish to thank Dr. L. M. Gantayat, Director, BTDG, BARC for their keen interest and support for this work. The author also wish to thank Shri R.B.Chavan ( SO/D, APPD) and Shri Sudhir Singh (SO/F, IADD) for their guidance during work.

## Reference

- [1] P. Roychowdhury and D. P. Chakravarthy, Rev. Sci Instrum. 80, 123305 (2009) "High intensity electron cyclotron resonance proton source for low energy high intensity proton accelerator".
- [2] www.moxa.com
- [3] www.advantech.com