NEW CONTROL SYSTEM FOR LAPECR2
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INTRODUCTION
Lanzhou All Permanent magnet ECR ion source No.2 (LAPECR2) is the ion source for 320 kV multidiscipline research platform for highly charged ions. Its old control system has been used for nearly 12 years and some problems have been gradually exposed and affected its daily operation. A set of PLC from Beckhoff company is in charge of the control of magnet power supplies, diagnostics and motion control. EPICS and Control System Studio (CSS) as well other packages are used in this facility as the control software toolkit. Based on these state-of-the-art technologies on both hardware and software, this paper designed and implemented a new control system for LAPECR2. After about half a year of running, the new control reflects its validity and stability in this facility.

NEW CONTROL SYSTEM ARCHITECTURE
There are two high potentials on the high voltage platform on which the LAPECR2 located. Electrical potential difference is needed and we used wireless communication to integrate all controlled devices together.

In design and implementation of the new control system, we adopted PLC from Beckhoff company to finish the control of passive devices and motion control. As for software, we chose EPICS as the integrated development framework.

OPERATOR INTERFACE
Control System Studio (CSS) is used for rapid development. OPI has a main panel and three sub panels. Operation and monitoring is done in the “Adjust Beam” sub panel. The “Spectrum” sub panel is used to plot spectrogram and select the needed ion beam.

HARDWARE CONFIGURATION
A powerful industry computer from Advantech company running CentOS 6.6 is used as EPICS IOC.
A high performance PLC from Beckhoff manages all analog devices, digital I/O devices, motion controls and interlocks. Communication between IOC and PLC is based on TCP socket.
Serial port servers were used to convert serial protocols to TCP socket for data exchange through the control network. Thus, all devices were integrated together into the control system network in a seamless way.
Two servo motors with absolute positioning functionality even when they are powered off are used to adjust two gas valves. The motor driver is also managed by the PLC through EtherCAT field bus.

This functionality provides the operators with precise control and quantitative reference. The servo motors need self-calibration zero spot only once after installation.