THE CONTROL SYSTEM OF SPES TARGET: CURRENT STATUS AND PERSPECTIVES

Presenter : G.Bassato (giorgio.bassato@lnl.infn.it)

M. Giacchini, A. Andrighetto, L. Costa, R. Izsak#, G. Prete, J. Vasquez* INFN, Laboratori Nazionali di Legnaro, Legnaro PD, ITALY

***# on leave from University of Budapest, Hungary *on leave from Universidad Simon* Bolivar, Caracas, Venezuela.**

ABSTRACT

The new project of a facility for the Selective Production of Exotic Species (SPES) is starting at LNL [1]. The neutron-rich nuclei will be produced by impinging an UCx target with a 70 MeV, 200 µA proton beam delivered by a commercial cyclotron. The construction of the Target Laboratory, the most innovative and critical part of the entire facility, is at advanced stage and its control system is being developed using EPICS . We present the status of the Target control system and describe the overall architecture foreseen for SPES.

THE SPES TARGET

The Target is based on a novel concept of multi-disk device, optimized from the point of view of dissipated power and release time of produced fragments. Fig. 1 shows the target structure: splitting the target into several disks increases the thermal surface and consequently the power dissipated by thermal radiation, thus simplifying the requirements of cooling system. According to the simulations, the target will be able to sustain a beam power of 8KW; under this condition we expect a production rate of 10^{13} fragments/s, which is adequate for the planned experiments with radioactive beams.

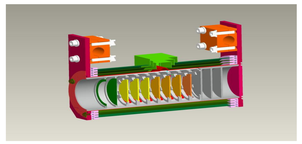


Fig.1 Target multi-disk structure

The target is integral part of the Ion Source, that is of surface ionization type, with the possibility of including a laser to improve selectively. Being the realization of the target at a still experimental stage, a Target Laboratory has been setup as a test bench facility, to measure the physical characteristics of its components and verify the operation of associated instruments. In this sense, it also constitutes a test bench for SPES Control System, since SPES will replicate the same architecture and use the software tools we are currently using in the control of the Target Laboratory.

THE OPERATOR INTERFACE

As well known, Epics offers many tools to create user graphic interfaces. The traditional tools based on Motif (i.e. EDM) provide a very fast way to test application prototypes but probably they aren't the best solution for the design of a new control system. We tested with appealing results from the point of view graphic rendering (see an example in fig.2) an alternative approach based on LabView. A solution to use LabView as Channel Access client on Windows PCs has been developed at SNS [2] and made available in form of a DLL library that supports the exchange of data with a VI throughout a shared memory block. A different method consists in using "network shared variables" (as defined by LabView terminology); NI committed itself to support this technology and included Epics Client functionality in the LabView 8.6 distribution. More general and modern tools are based on Java; the most known and feature rich is CSS (Control System Studio) [3] originally developed at DESY and now supported by a collaboration of many Laboratories, including Los Alamos, SNS and Argonne National Laboratory. We plan to test CSS in the control of SPES Target within the current year.

http://www.lnl.infn.it/~epics/spes.html

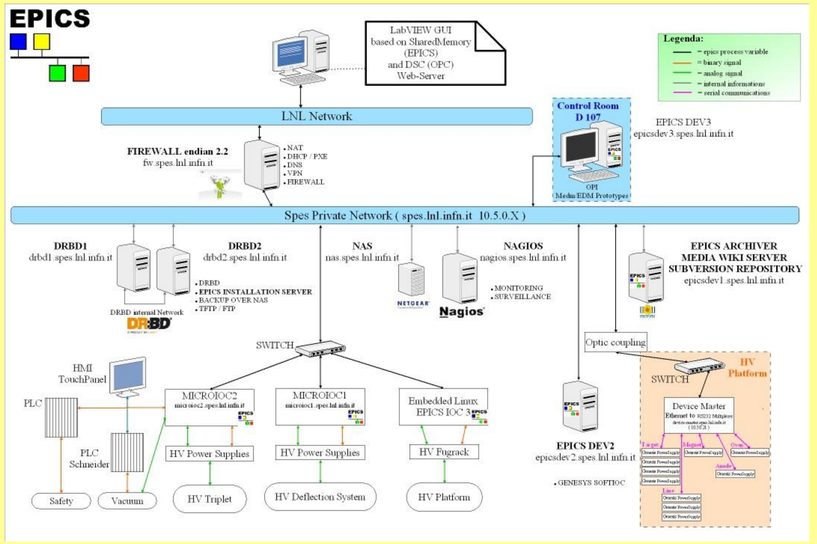
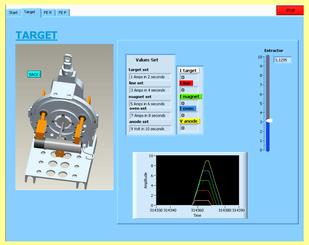


***FIG. 2** : Layout of Target Laboratory control network*



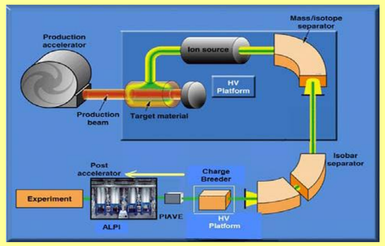


***FIG. 3** : LabView GUI*

REFERENCES

[1] http://www.lnl.infn.it/~spes/tech_design_2007/
[2] http://neutrons.ornl.gov/diagnostics/documents/epics/LabVIEW/
[3] http://css.desy.de/content/index_eng.html
[4] http://www.aps.anl.gov/epics/irmis/index.php

THE TARGET CONTROL SYSTEM

The control system includes two main classes of devices: those concerning the beam production, selection and transport and those related to safety. Safety has a crucial role in the control system due to the high radiation levels in the target and ion source area and the design criteria must comply with the specifications foreseen for nuclear installations. PLCs will be widely used in all safety applications since these devices are specifically designed to guarantee a high availability under harsh operating conditions.
EPICS was chosen as general framework to develop SPES controls because it is hardware independent, open-source and well supported by a wide collaboration of scientific Laboratories around the world. As result, all SPES subsystems, including those based on PLCs, will be integrated under a common communication layer based on the high performance Channel Access protocol.

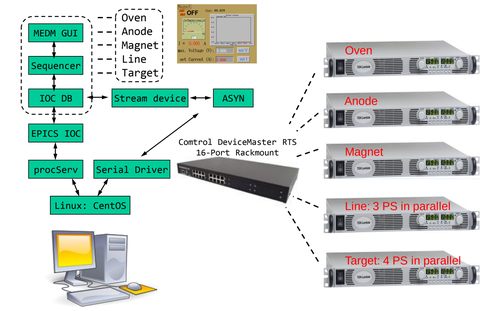


***FIG. 4**: Genesys High Current Power Supply schema layout*

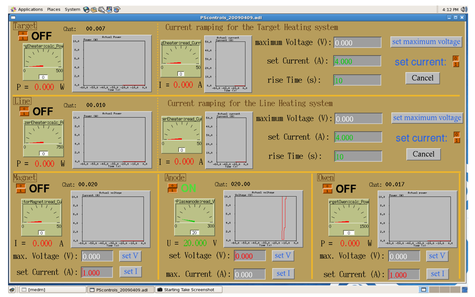


***FIG. 5**: Genesys High Current Power Supply MEDM Interface*

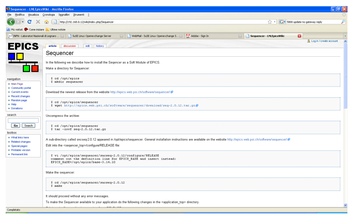


***FIG. 6**: Documentation: MediaWiki Server*

CONCLUSIONS

The work carried out for the control of the SPES Target prototype has been an important test bench to verify the validity of the software architecture proposed for the entire facility. A few issues still remain open: a very important one is the realization of a comprehensive documentation of EPICS databases loaded in all IOCs. To this purpose, one of next steps will be the installation of IRMIS[4]: this work is planned within spring 2010.