Status of the NSRC SOLARIS Control System

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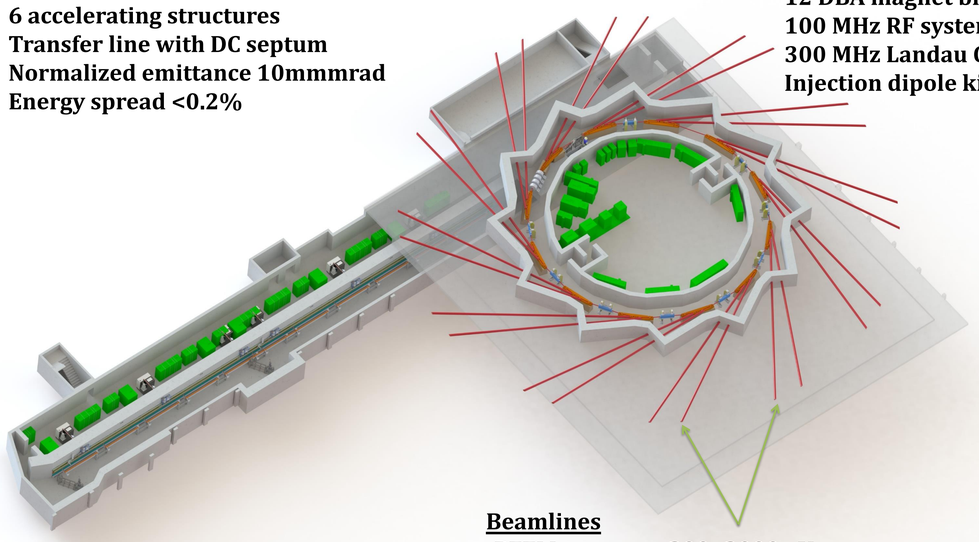
ABSTRACT

A NSRC SOLARIS is a synchrotron light source in Krakow, Poland. The control systems for the linac, storage ring and beamlines are fully operational and are used in the commissioning process.

SOLARIS OVERVIEW

600 MeV Injector
Thermionic RF Gun
6 accelerating structures
Transfer line with DC septum
Normalized emittance 10mmmrad
Energy spread <0.2%

1.5 GeV Storage Ring
12 DBA magnet blocks
100 MHz RF system
300 MHz Landau Cavities
Injection dipole kicker



Beamlines
- PEEM - energy : 200 -2000 eV
source: bending magnet
- UARPES- energy 8-1000 eV
source: elliptical polarized undulator with 120 mm period length

Fig. 1 SOLARIS layout

CONTROL SYSTEM ELEMENTS

Control system for the linac, storage ring and each beamline consists of the following parts:

- Instance of the Tango DB:
  - Applications facilitating access to the devices' parameters
  - Diagnostic & management tools
- Archiving:
  - Historic Database
  - Temporary Database
- Sardana (at beamlines):
  - Configuration of measurements synchronised with motorisation
- Instance of SOLARIS Control Program and related custom GUIs
- Hardware.

All signals are accessible from workstations near beamlines and from the Control Room.

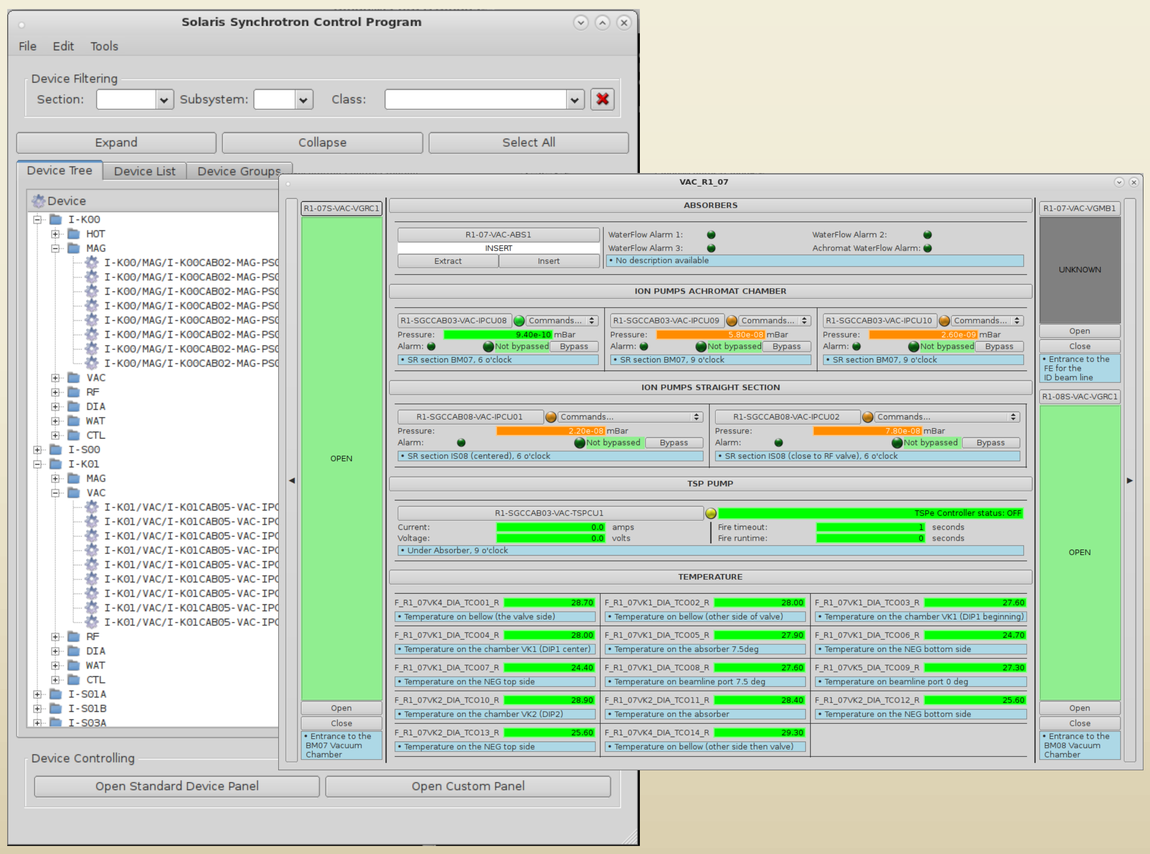


Fig. 2 SOLARIS Synchrotron Control Program

TANGO CONTROL SYSTEM

Software platform for the control system is Tango Controls. The control system based on Tango Controls has a lot of elements: Tango Host server with database, archiving system, high level and low level software. At Solaris there are three instances of Tango: one for a linac and a storage ring (Tango 9) and one per each of two beamlines (Tango 8 at UARPES and TANGO 9 at PEEM/XAS). They are responsible for acquisition of more than 5000 signals. An archiving system is using TDB and HDB tools from Soleil. At PEEM/XAS beamline are there are held tests of HDB++ archiving system. At Solaris low level applications are developed in the Python programming language using an API to the Tango core – the PyTango package. Device servers are used for connection of hardware to the control system. The facade device library from MAX IV (Lund, Sweden) is used for high-level Tango devices. The Taurus package from ALBA (Barcelona, Spain) is used for writing a high level software, like GUIs. For browsing Tango database and checking each device operators use an open source application ControlProgram. The ControlProgram is also used for running Tango tools and another GUIs.

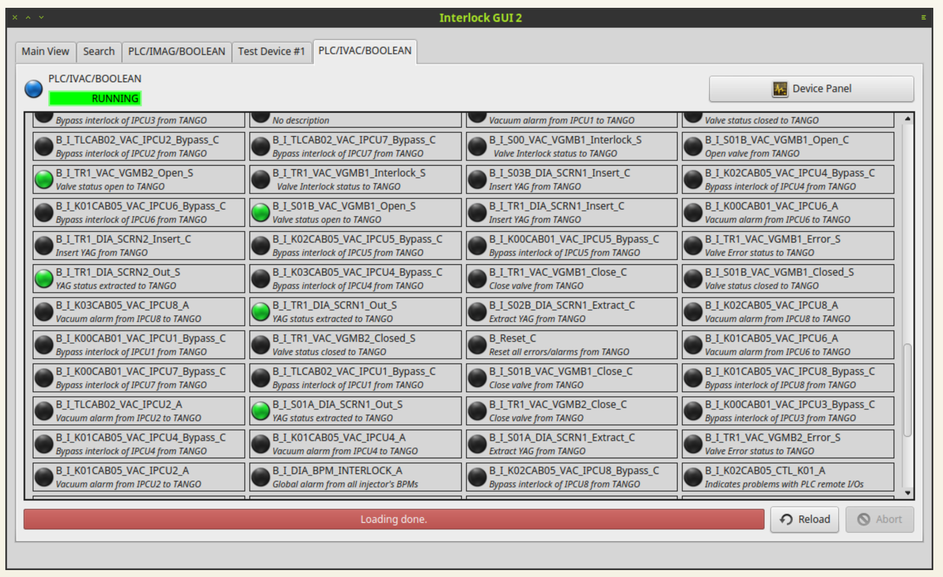


Fig. 3 Panel for displaying alarms from PLCs

SARDANA, SCANS AND SPOCK

Sardana is an open-source framework serving as SCADA (Supervisory, Control And Data Acquisition). Its main role is to provide interface for performing scans (continuous movements of motors and synchronised acquisition from various sources) which are essential in conducting experiments. The results can be plotted live and stored for later processing. It is also integrated with Tango and facilitates communication with motorisation.

There are two ways of using Sardana: a command line interface (CLI) or graphical user interfaces (GUIs). The former is called Spock – it imitates SPEC from ESRF, Grenoble in functionality, but it's based on Python's interactive console, IPython. The latter is built using Taurus – PyQt-based GUI library for Tango. Operators can create simple panels with just clicking and programmers can benefit from the application programming interface (API) in preparing more advanced GUIs.

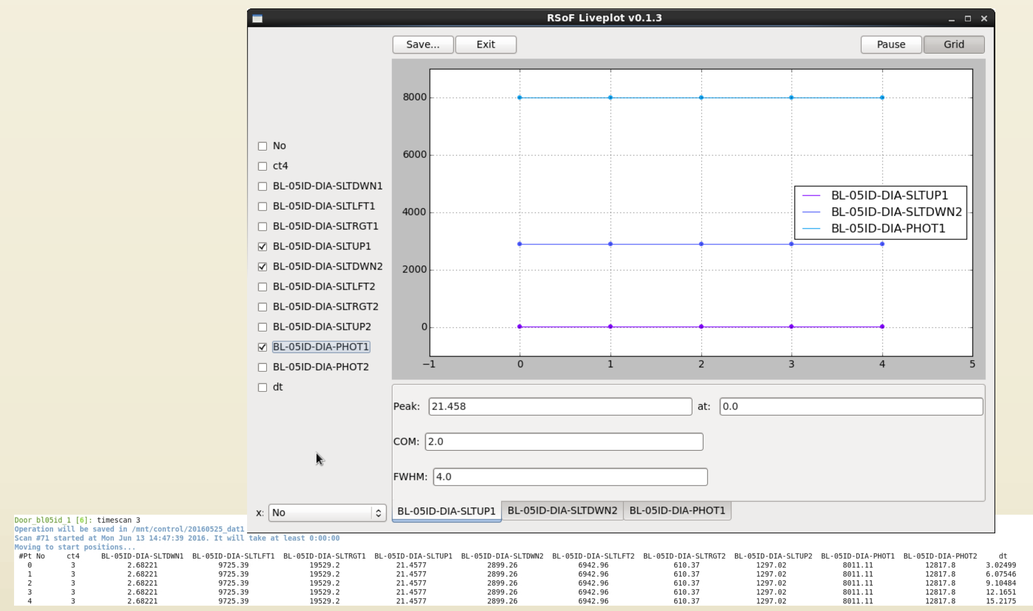


Fig. 4 Scanning in Sardana's CLI, Spock, and live plotting

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