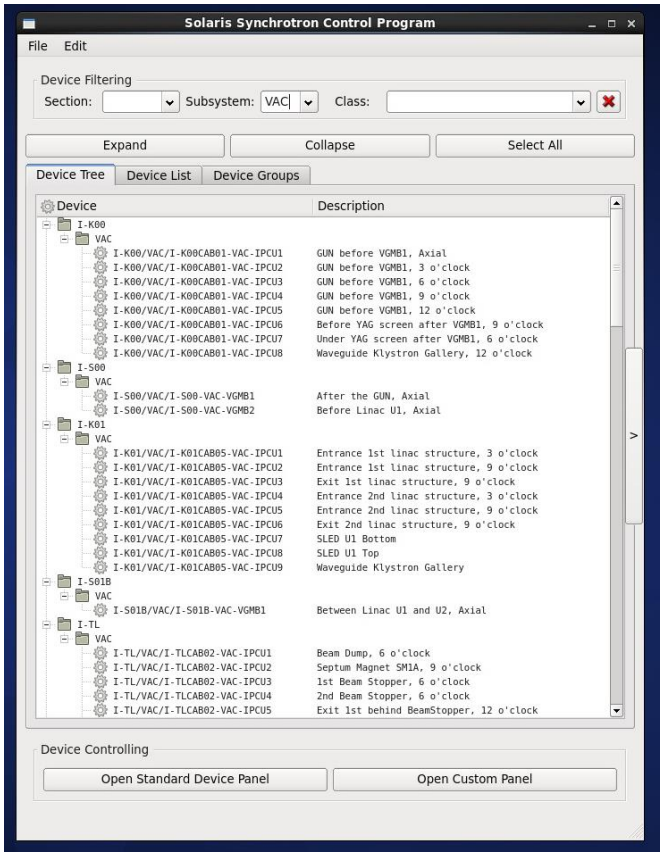
A Structured Approach to Control System GUI Design for the Solaris Light Source

Solaris Synchrotron Control Program

Challanges

- Machine control and state overview program
- Single entry point
- Broad set of controls GUIs required
- Multiple instances foreseen
- Adjust according to user feedback

- Existing tools not sufficient
- Limited budget

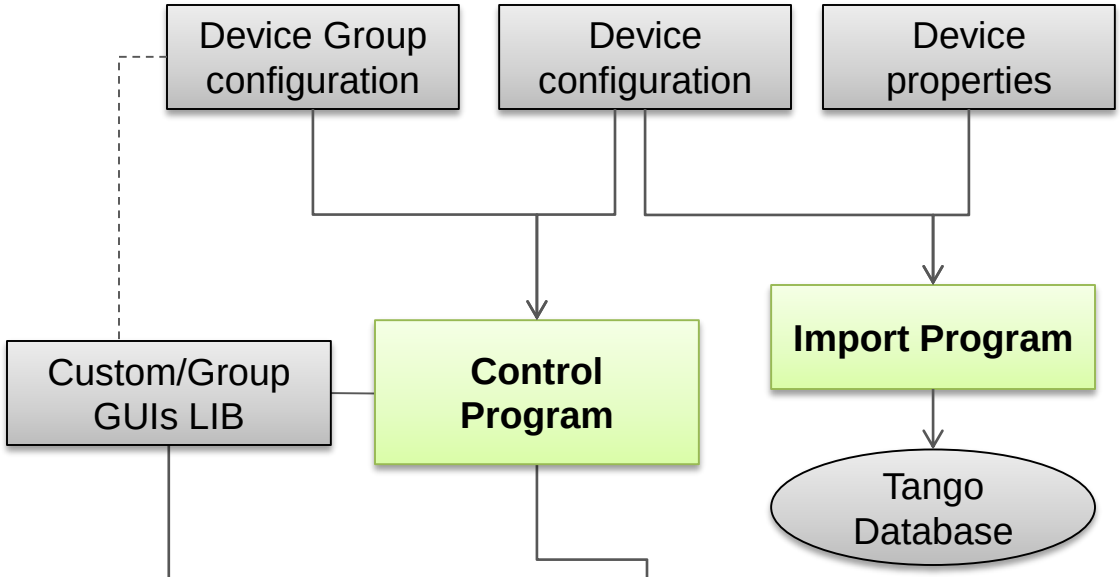


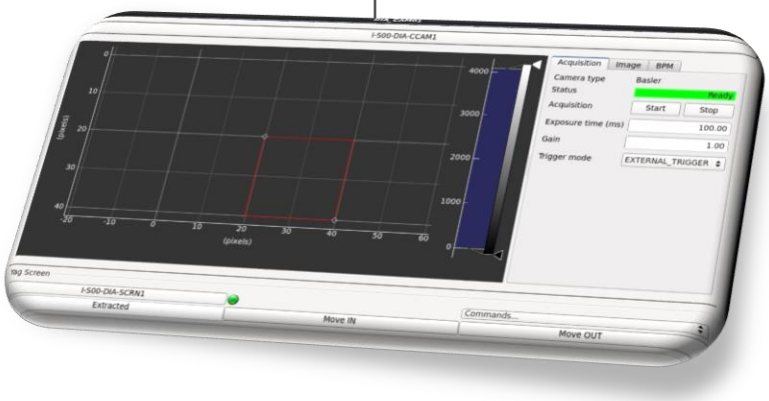
Goals

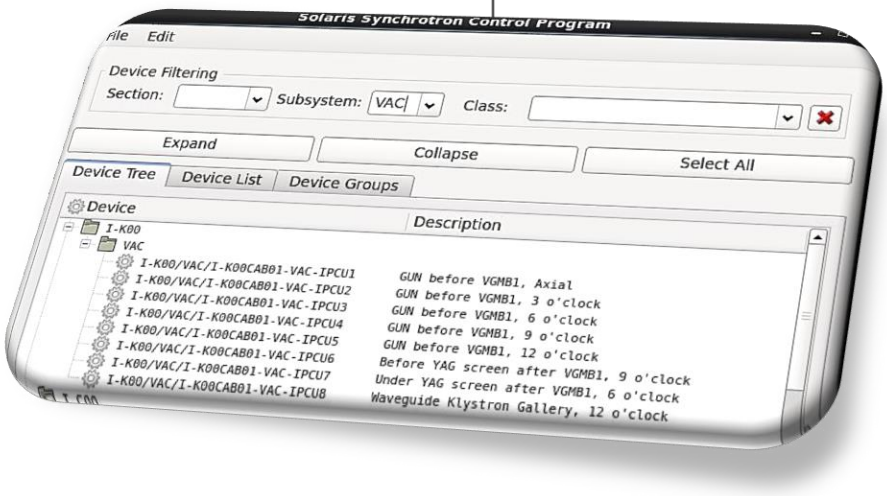
- **Achieve predictable and consistent behavior of the control room software**
- **Provide required set of functionality and features for operation**
- **Transparent and convenient use**
- **Configuration driven**
  - One source of information
  - Evade hardcoding
  - Dynamic GUI generation – generic panels
- **Extensibility**
  - Dedicated templates
  - Support for external applications
- **Provide easy deployment and maintenance through scripting**

Product

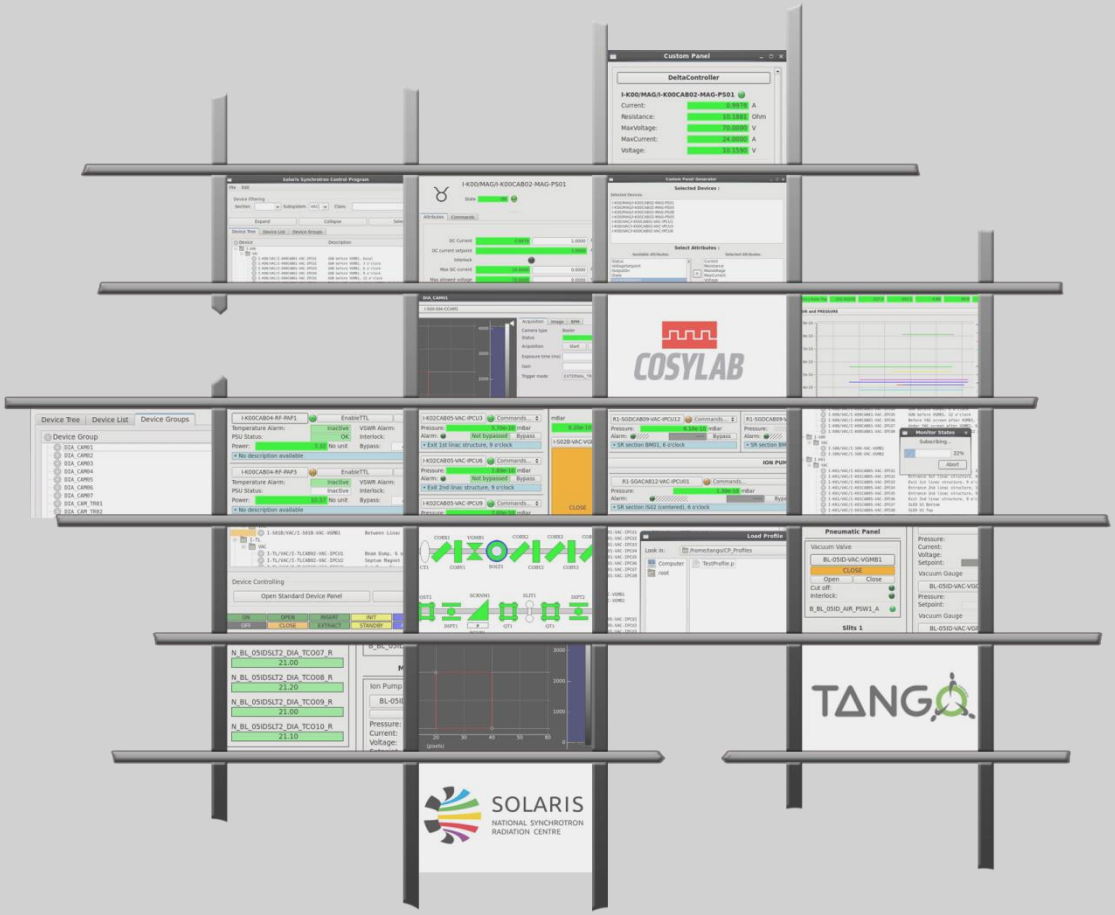
- **Deliverables**
  - **Import Program**
  - **Control Program**
  - **GUI runner**
    - Instance manager
    - Update manager
- **Solaris**
  - Synchrotron Control System
  - Uarpes Control System
  - Peem Control System







Control Program



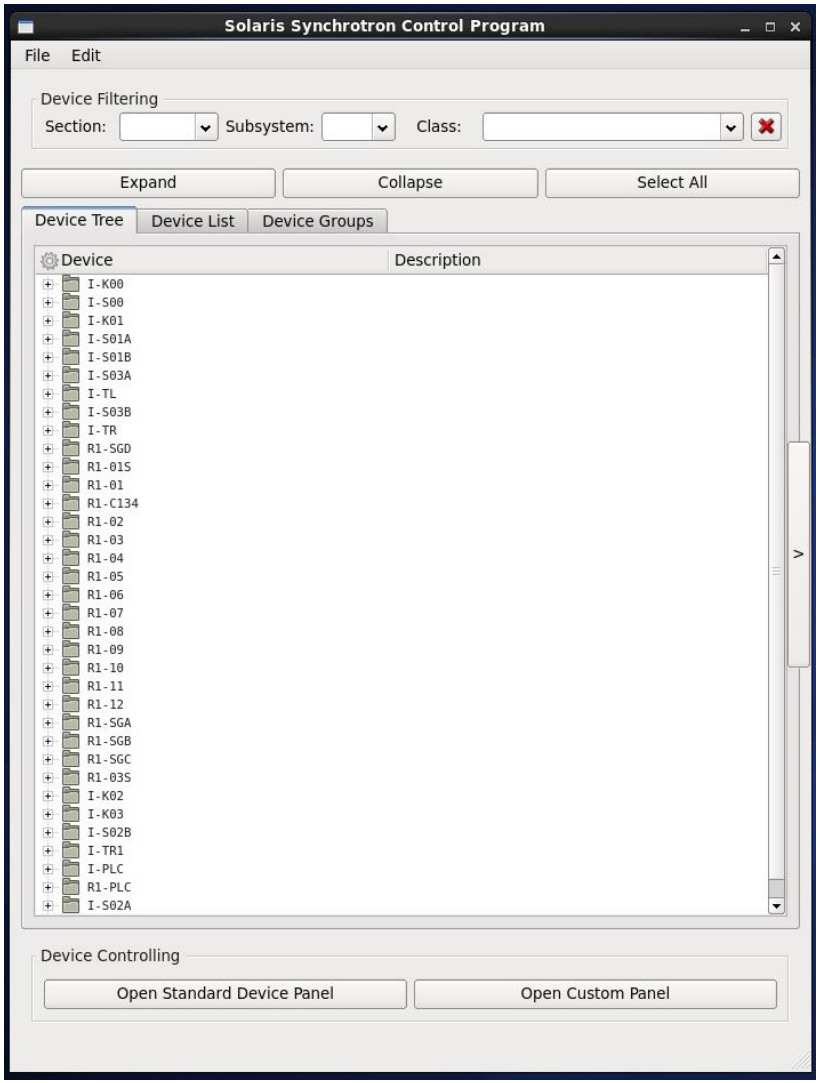
Control Program Features

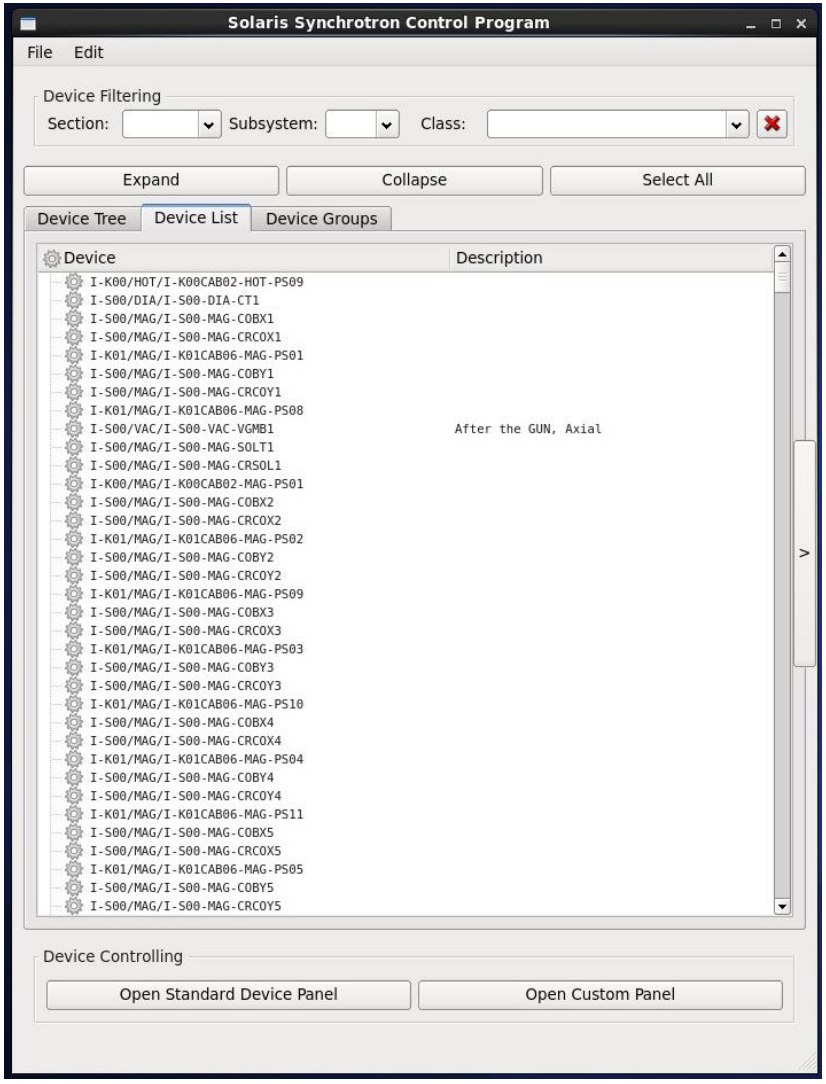
- **Features**
  - **Device Overview**
    - Taurus panels, specialized panels
    - Organized access, various filtering options
    - Browsing in respect to facility structure
  - **Custom generated panels**
    - User input, dynamic generation
  - **Device Groups**
    - Panels aggregating multiple devices
    - Easy operation using dedicated screens
    - Transparent overview of subsystems
  - **Profile Management**
  - **Device State Monitoring**
    - Full or selective

Control Program Features

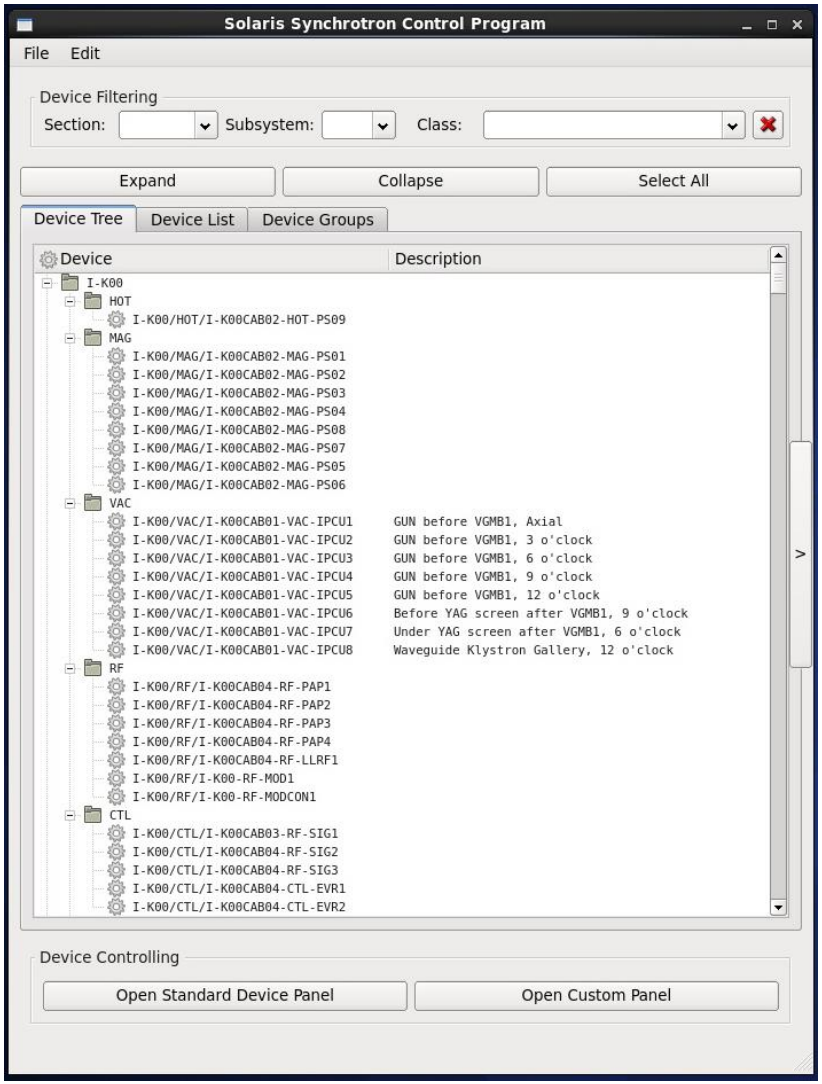
- **Features**
  - **Device Overview**
    - Taurus panels, specialized panels
    - Organized access, various filtering options
    - Browsing in respect to facility structure

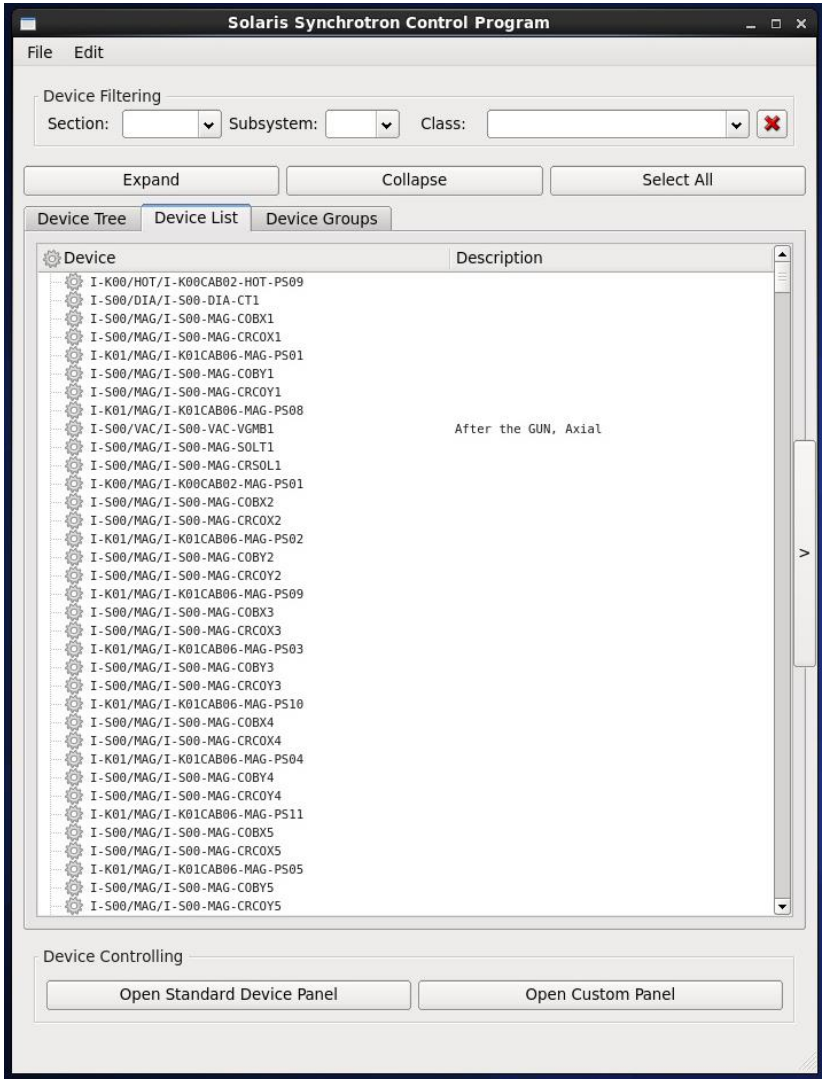
Device View


Solaris Synchrotron Control Program
File
Edit
Device Filtering
Section:
Subsystem:
Class:
Expand
Collapse
Select All
Device Tree
Device List
Device Groups
Device
Description
I-K00
I-S00
I-K01
I-S01A
I-S01B
I-S03A
I-TL
I-S03B
I-TR
R1-SGD
R1-01S
R1-01
R1-C134
R1-02
R1-03
R1-04
R1-05
R1-06
R1-07
R1-08
R1-09
R1-10
R1-11
R1-12
R1-SGA
R1-SGB
R1-SGC
R1-03S
I-K02
I-K03
I-S02B
I-TR1
I-PLC
R1-PLC
I-S02A
Device Controlling
Open Standard Device Panel
Open Custom Panel

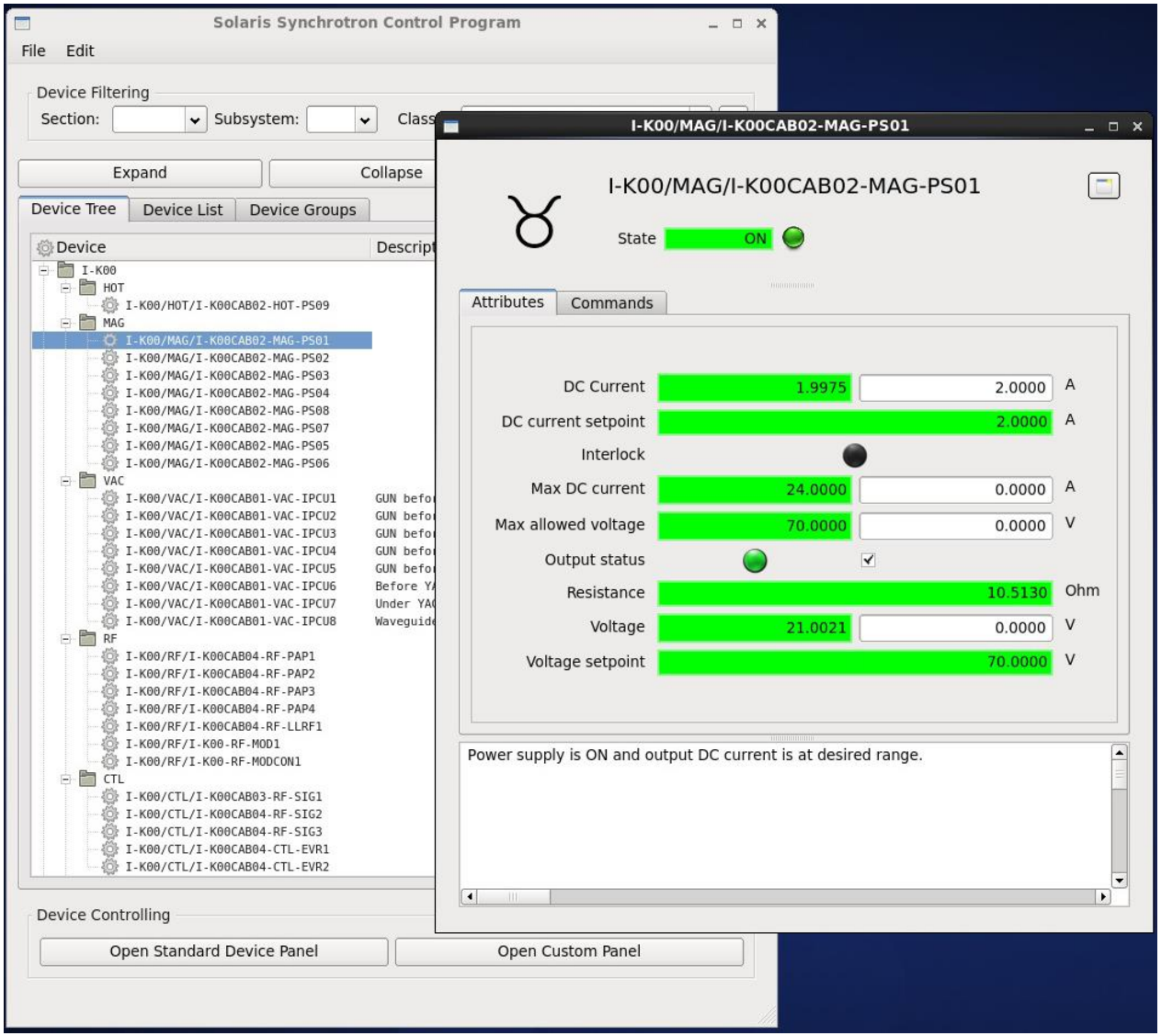

Solaris Synchrotron Control Program
File
Edit
Device Filtering
Section:
Subsystem:
Class:
Expand
Collapse
Select All
Device Tree
Device List
Device Groups
Device
Description
I-K00/HOT/I-K00CAB02-HOT-PS09
I-S00/DIA/I-S00-DIA-CT1
I-S00/MAG/I-S00-MAG-COBX1
I-S00/MAG/I-S00-MAG-CRCOX1
I-K01/MAG/I-K01CAB06-MAG-PS01
I-S00/MAG/I-S00-MAG-COBY1
I-S00/MAG/I-S00-MAG-CRCOY1
I-K01/MAG/I-K01CAB06-MAG-PS08
I-S00/VAC/I-S00-VAC-VGMB1
After the GUN, Axial
I-S00/MAG/I-S00-MAG-SOLT1
I-S00/MAG/I-S00-MAG-CRSOL1
I-K00/MAG/I-K00CAB02-MAG-PS01
I-S00/MAG/I-S00-MAG-COBX2
I-S00/MAG/I-S00-MAG-CRCOX2
I-K01/MAG/I-K01CAB06-MAG-PS02
I-S00/MAG/I-S00-MAG-COBY2
I-S00/MAG/I-S00-MAG-CRCOY2
I-K01/MAG/I-K01CAB06-MAG-PS09
I-S00/MAG/I-S00-MAG-COBX3
I-S00/MAG/I-S00-MAG-CRCOX3
I-K01/MAG/I-K01CAB06-MAG-PS03
I-S00/MAG/I-S00-MAG-COBY3
I-S00/MAG/I-S00-MAG-CRCOY3
I-K01/MAG/I-K01CAB06-MAG-PS10
I-S00/MAG/I-S00-MAG-COBX4
I-S00/MAG/I-S00-MAG-CRCOX4
I-K01/MAG/I-K01CAB06-MAG-PS04
I-S00/MAG/I-S00-MAG-COBY4
I-S00/MAG/I-S00-MAG-CRCOY4
I-K01/MAG/I-K01CAB06-MAG-PS11
I-S00/MAG/I-S00-MAG-COBX5
I-S00/MAG/I-S00-MAG-CRCOX5
I-K01/MAG/I-K01CAB06-MAG-PS05
I-S00/MAG/I-S00-MAG-COBY5
I-S00/MAG/I-S00-MAG-CRCOY5
Device Controlling
Open Standard Device Panel
Open Custom Panel

Device View


Solaris Synchrotron Control Program
File Edit
Device Filtering
Section: Subsystem: Class:
Expand Collapse Select All
Device Tree Device List Device Groups
Device Description
I-K00
HOT
I-K00/HOT/I-K00CAB02-HOT-PS09
MAG
I-K00/MAG/I-K00CAB02-MAG-PS01
I-K00/MAG/I-K00CAB02-MAG-PS02
I-K00/MAG/I-K00CAB02-MAG-PS03
I-K00/MAG/I-K00CAB02-MAG-PS04
I-K00/MAG/I-K00CAB02-MAG-PS08
I-K00/MAG/I-K00CAB02-MAG-PS07
I-K00/MAG/I-K00CAB02-MAG-PS05
I-K00/MAG/I-K00CAB02-MAG-PS06
VAC
I-K00/VAC/I-K00CAB01-VAC-IPCU1 GUN before VGMB1, Axial
I-K00/VAC/I-K00CAB01-VAC-IPCU2 GUN before VGMB1, 3 o'clock
I-K00/VAC/I-K00CAB01-VAC-IPCU3 GUN before VGMB1, 6 o'clock
I-K00/VAC/I-K00CAB01-VAC-IPCU4 GUN before VGMB1, 9 o'clock
I-K00/VAC/I-K00CAB01-VAC-IPCU5 GUN before VGMB1, 12 o'clock
I-K00/VAC/I-K00CAB01-VAC-IPCU6 Before YAG screen after VGMB1, 9 o'clock
I-K00/VAC/I-K00CAB01-VAC-IPCU7 Under YAG screen after VGMB1, 6 o'clock
I-K00/VAC/I-K00CAB01-VAC-IPCU8 Waveguide Klystron Gallery, 12 o'clock
RF
I-K00/RF/I-K00CAB04-RF-PAP1
I-K00/RF/I-K00CAB04-RF-PAP2
I-K00/RF/I-K00CAB04-RF-PAP3
I-K00/RF/I-K00CAB04-RF-PAP4
I-K00/RF/I-K00CAB04-RF-LLRF1
I-K00/RF/I-K00-RF-MOD1
I-K00/RF/I-K00-RF-MODCON1
CTL
I-K00/CTL/I-K00CAB03-RF-SIG1
I-K00/CTL/I-K00CAB04-RF-SIG2
I-K00/CTL/I-K00CAB04-RF-SIG3
I-K00/CTL/I-K00CAB04-CTL-EVR1
I-K00/CTL/I-K00CAB04-CTL-EVR2
Device Controlling
Open Standard Device Panel
Open Custom Panel

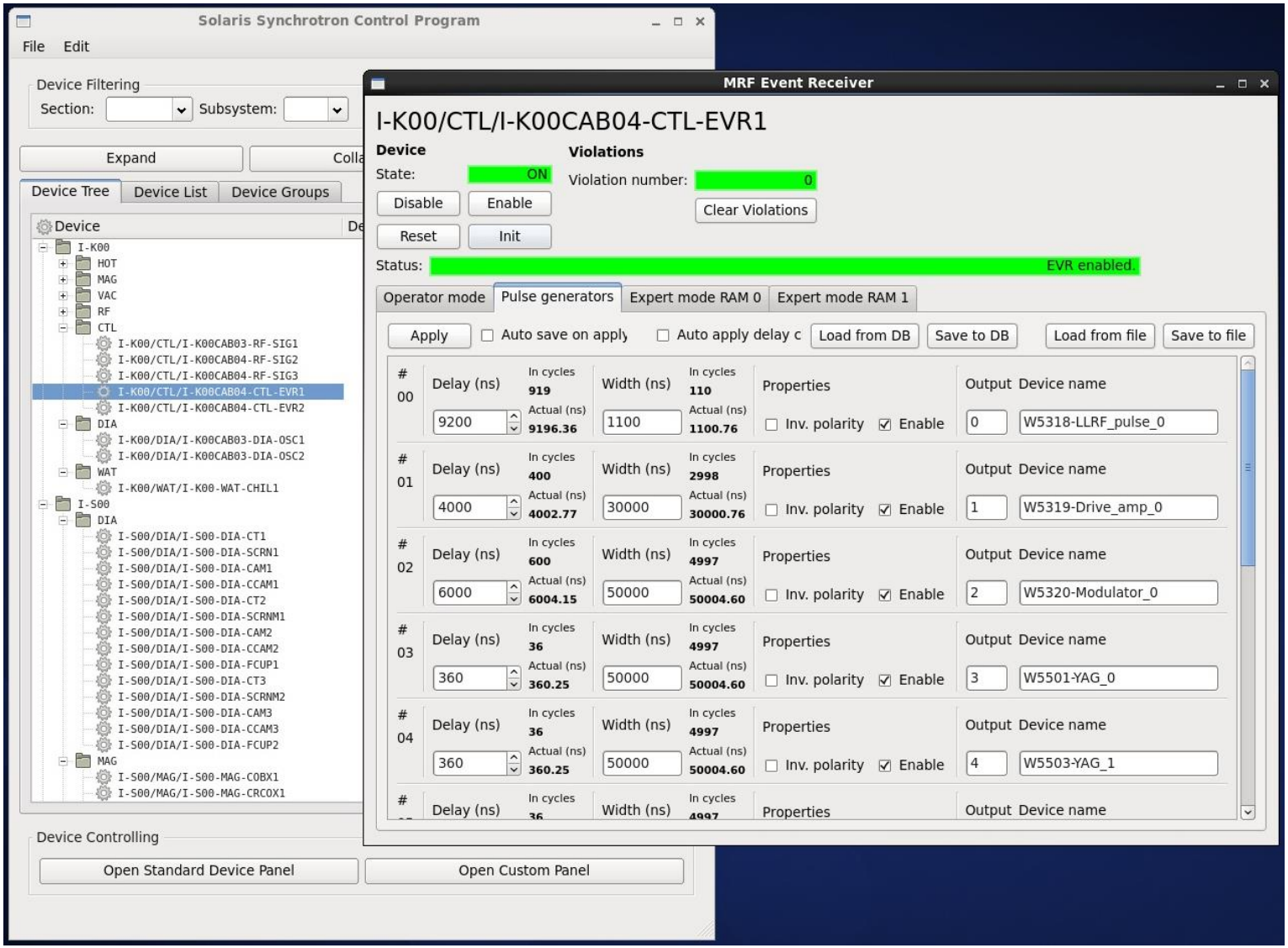

Solaris Synchrotron Control Program
File Edit
Device Filtering
Section: Subsystem: Class:
Expand Collapse Select All
Device Tree Device List Device Groups
Device Description
I-K00/HOT/I-K00CAB02-HOT-PS09
I-S00/DIA/I-S00-DIA-CT1
I-S00/MAG/I-S00-MAG-COBX1
I-S00/MAG/I-S00-MAG-CRCOX1
I-K01/MAG/I-K01CAB06-MAG-PS01
I-S00/MAG/I-S00-MAG-COBY1
I-S00/MAG/I-S00-MAG-CRCOY1
I-K01/MAG/I-K01CAB06-MAG-PS08
I-S00/VAC/I-S00-VAC-VGMB1 After the GUN, Axial
I-S00/MAG/I-S00-MAG-SOLT1
I-S00/MAG/I-S00-MAG-CRSOL1
I-K00/MAG/I-K00CAB02-MAG-PS01
I-S00/MAG/I-S00-MAG-COBX2
I-S00/MAG/I-S00-MAG-CRCOX2
I-K01/MAG/I-K01CAB06-MAG-PS02
I-S00/MAG/I-S00-MAG-COBY2
I-S00/MAG/I-S00-MAG-CRCOY2
I-K01/MAG/I-K01CAB06-MAG-PS09
I-S00/MAG/I-S00-MAG-COBX3
I-S00/MAG/I-S00-MAG-CRCOX3
I-K01/MAG/I-K01CAB06-MAG-PS03
I-S00/MAG/I-S00-MAG-COBY3
I-S00/MAG/I-S00-MAG-CRCOY3
I-K01/MAG/I-K01CAB06-MAG-PS10
I-S00/MAG/I-S00-MAG-COBX4
I-S00/MAG/I-S00-MAG-CRCOX4
I-K01/MAG/I-K01CAB06-MAG-PS04
I-S00/MAG/I-S00-MAG-COBY4
I-S00/MAG/I-S00-MAG-CRCOY4
I-K01/MAG/I-K01CAB06-MAG-PS11
I-S00/MAG/I-S00-MAG-COBX5
I-S00/MAG/I-S00-MAG-CRCOX5
I-K01/MAG/I-K01CAB06-MAG-PS05
I-S00/MAG/I-S00-MAG-COBY5
I-S00/MAG/I-S00-MAG-CRCOY5
Device Controlling
Open Standard Device Panel
Open Custom Panel

Default Device Panel



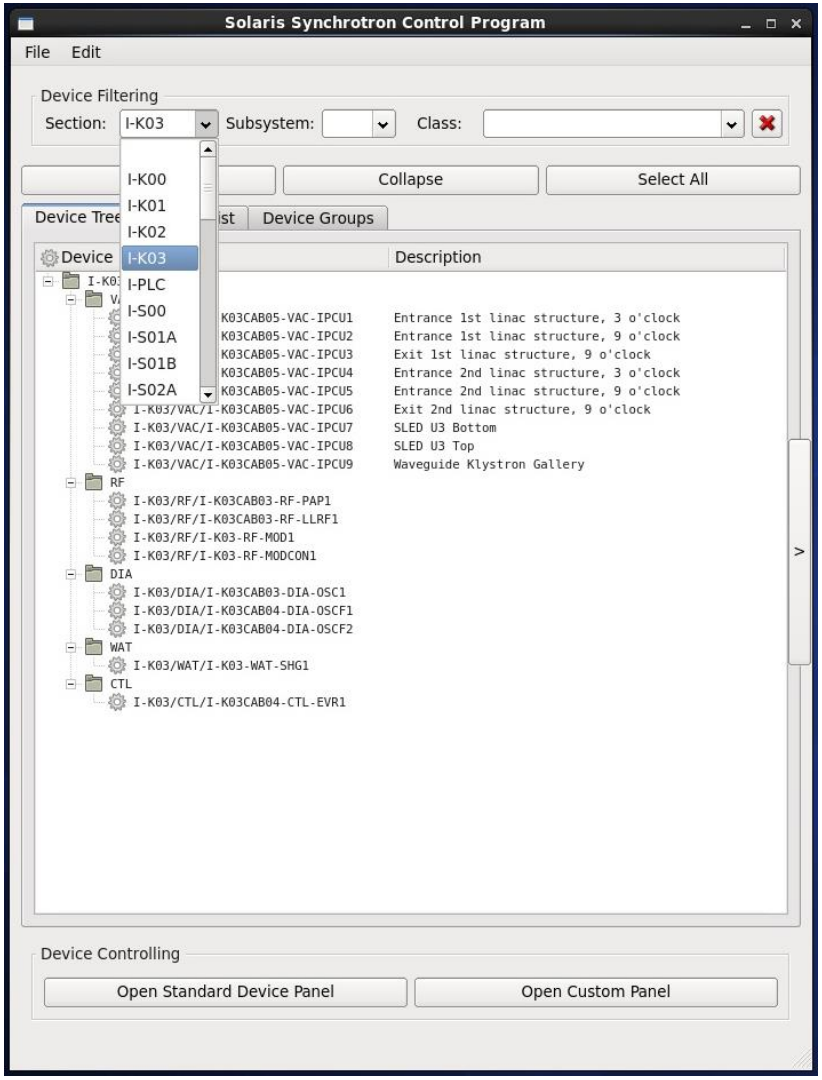
Specialized Device Panel

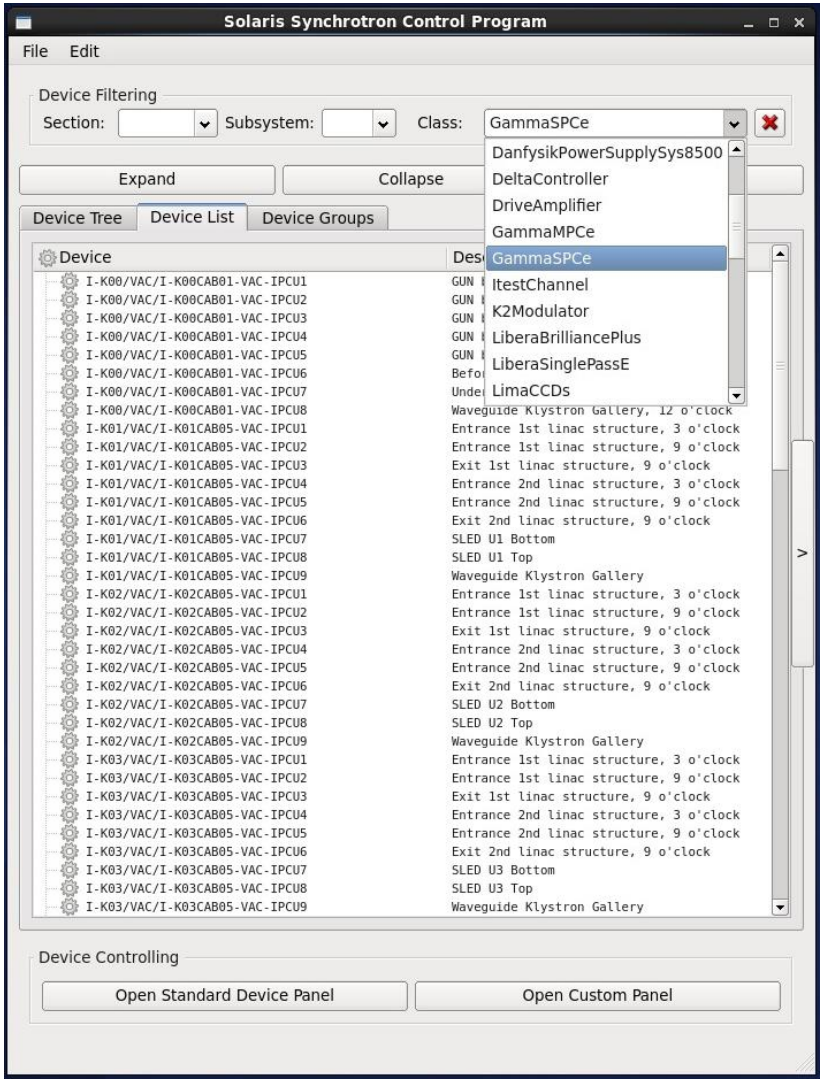
COSYLAB



Device Filtering

COSYLAB





Control Program Features

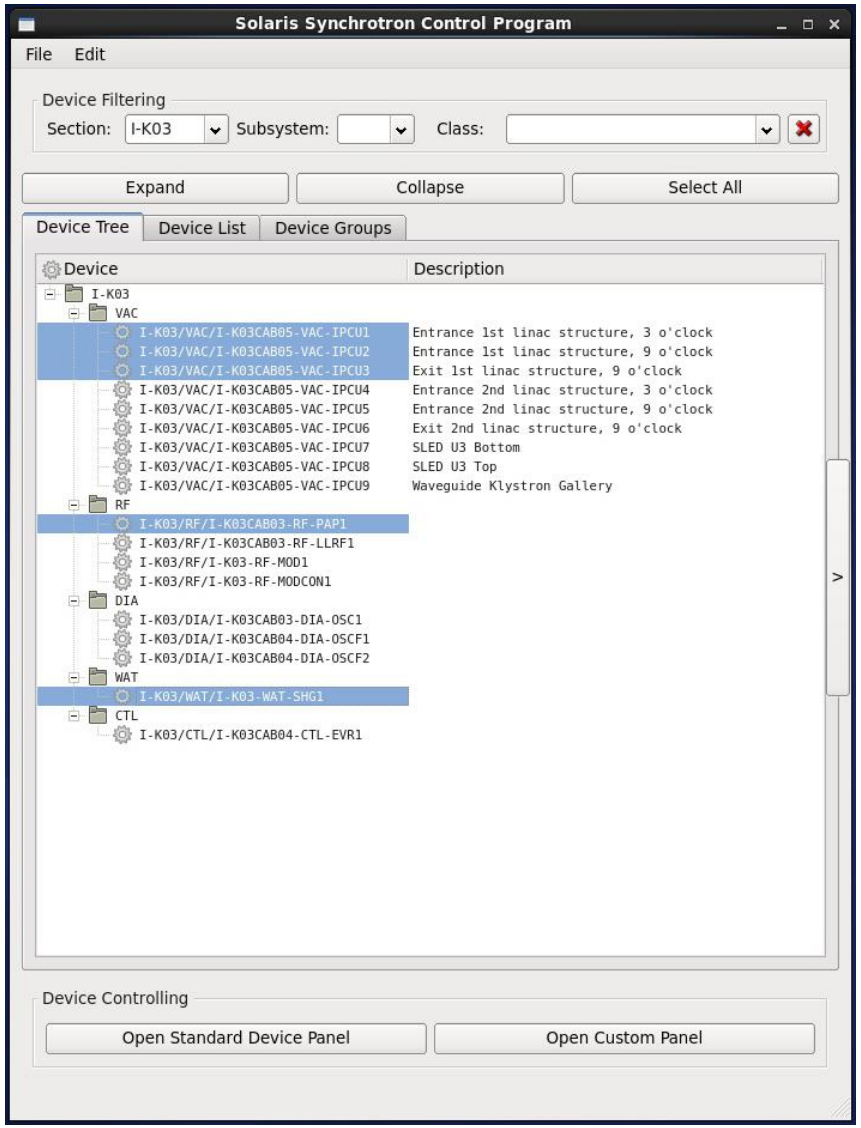
- **Features**
  - **Device Overview**
    - Taurus panels, specialized panels
    - Organized access, various filtering options
    - Browsing in respect to facility structure

Control Program Features

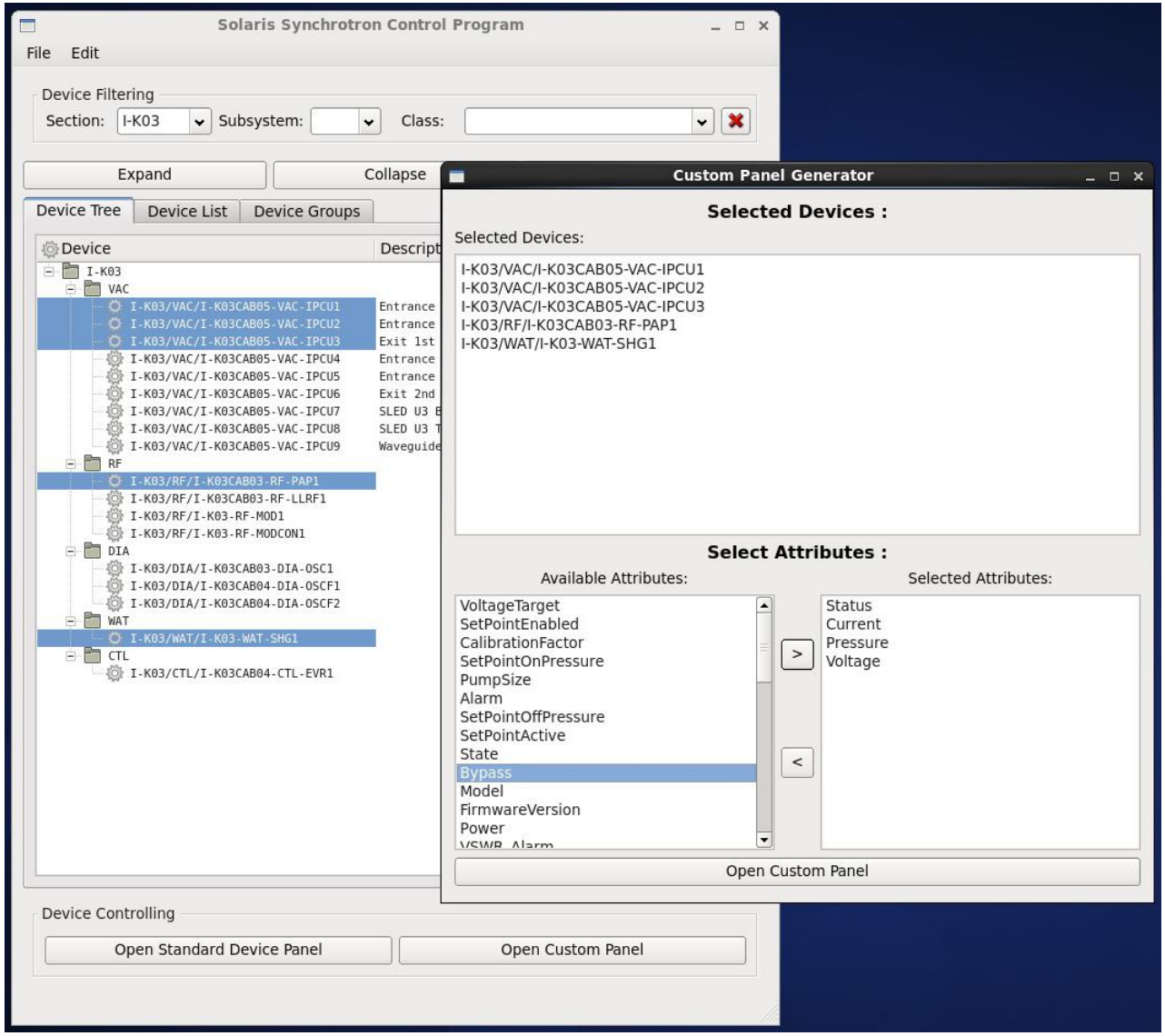
COSYLAB

- **Features**
  - **Device Overview**
    - Taurus panels, specialized panels
    - Organized access, various filtering options
    - Browsing in respect to facility structure
  - **Custom generated panels**
    - User input, dynamic generation

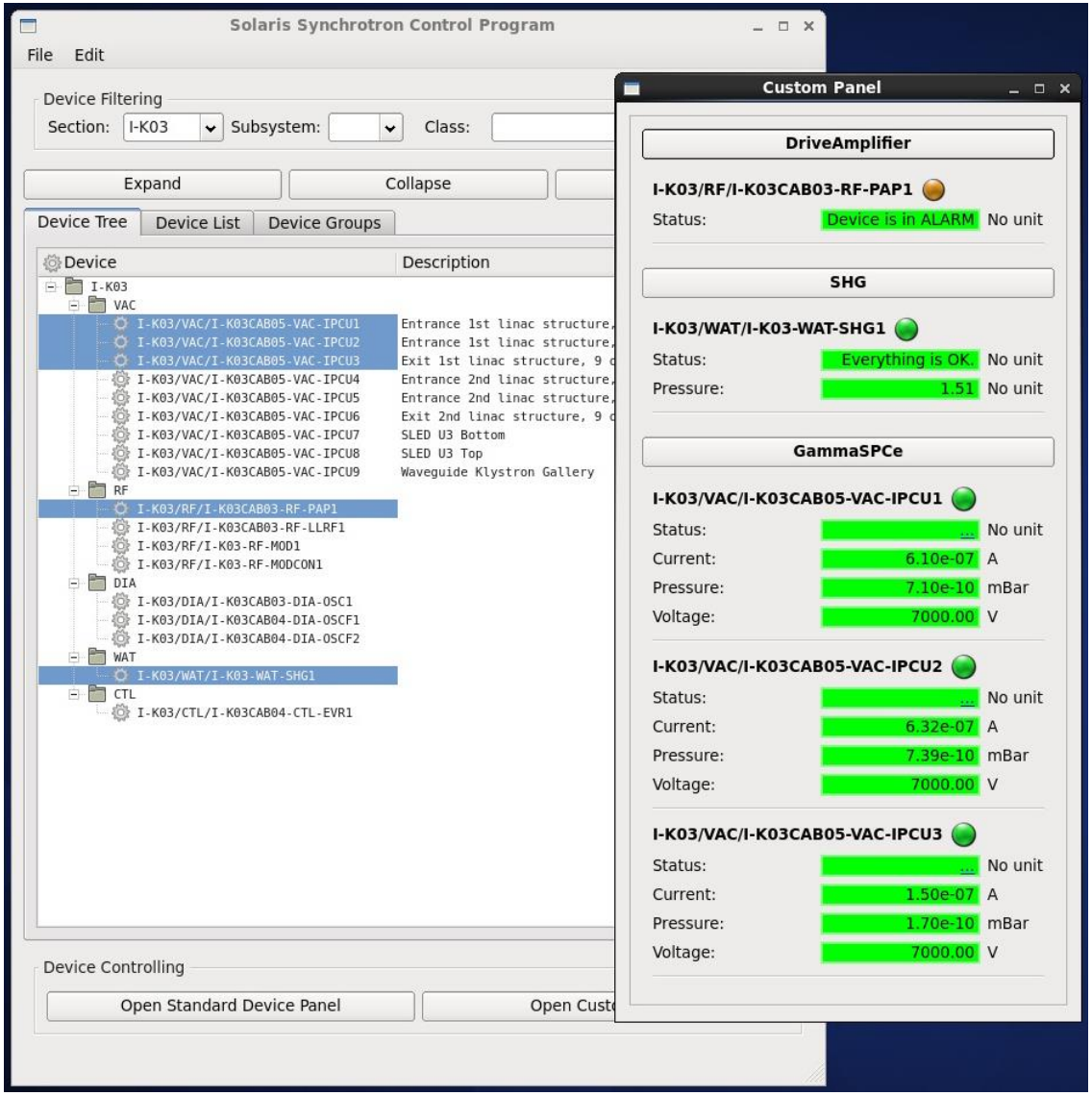
Custom Panel



Custom Panel



Custom Panel



Control Program Features

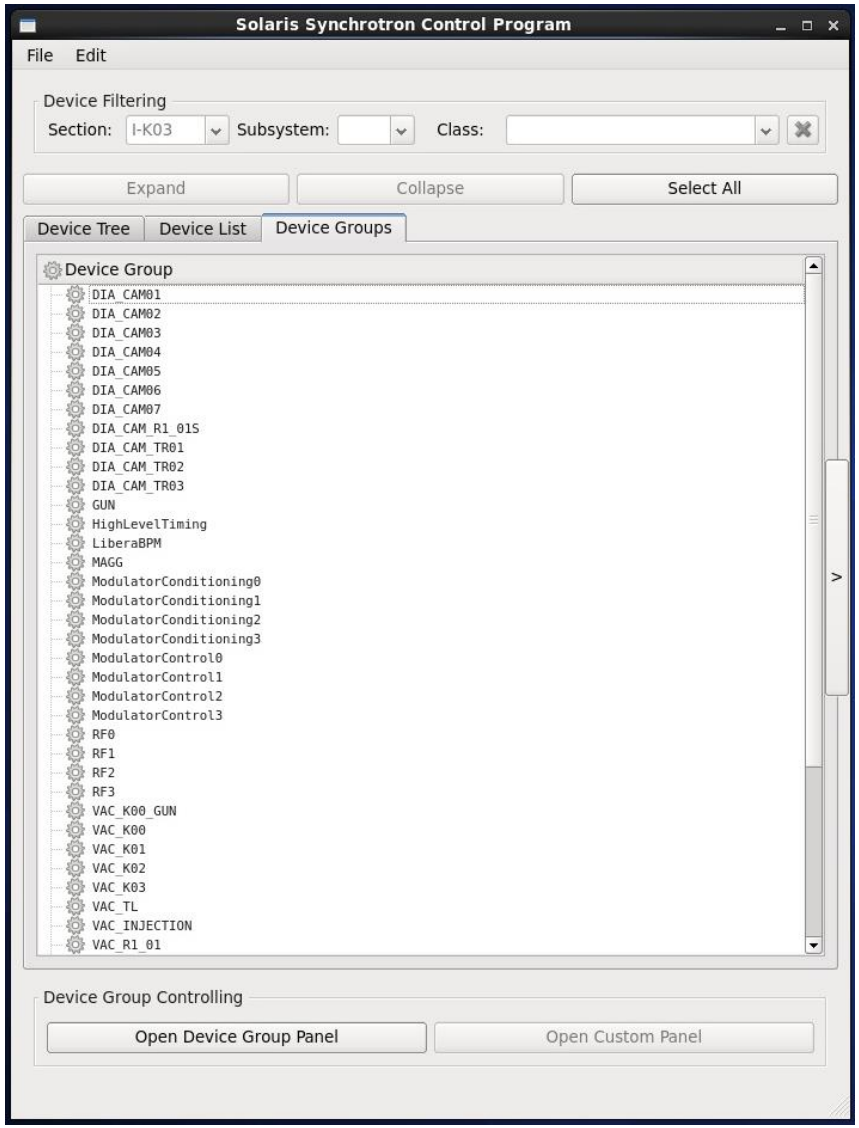
COSYLAB

- **Features**
  - **Device Overview**
    - Taurus panels, specialized panels
    - Organized access, various filtering options
    - Browsing in respect to facility structure
  - **Custom generated panels**
    - User input, dynamic generation

Control Program Features

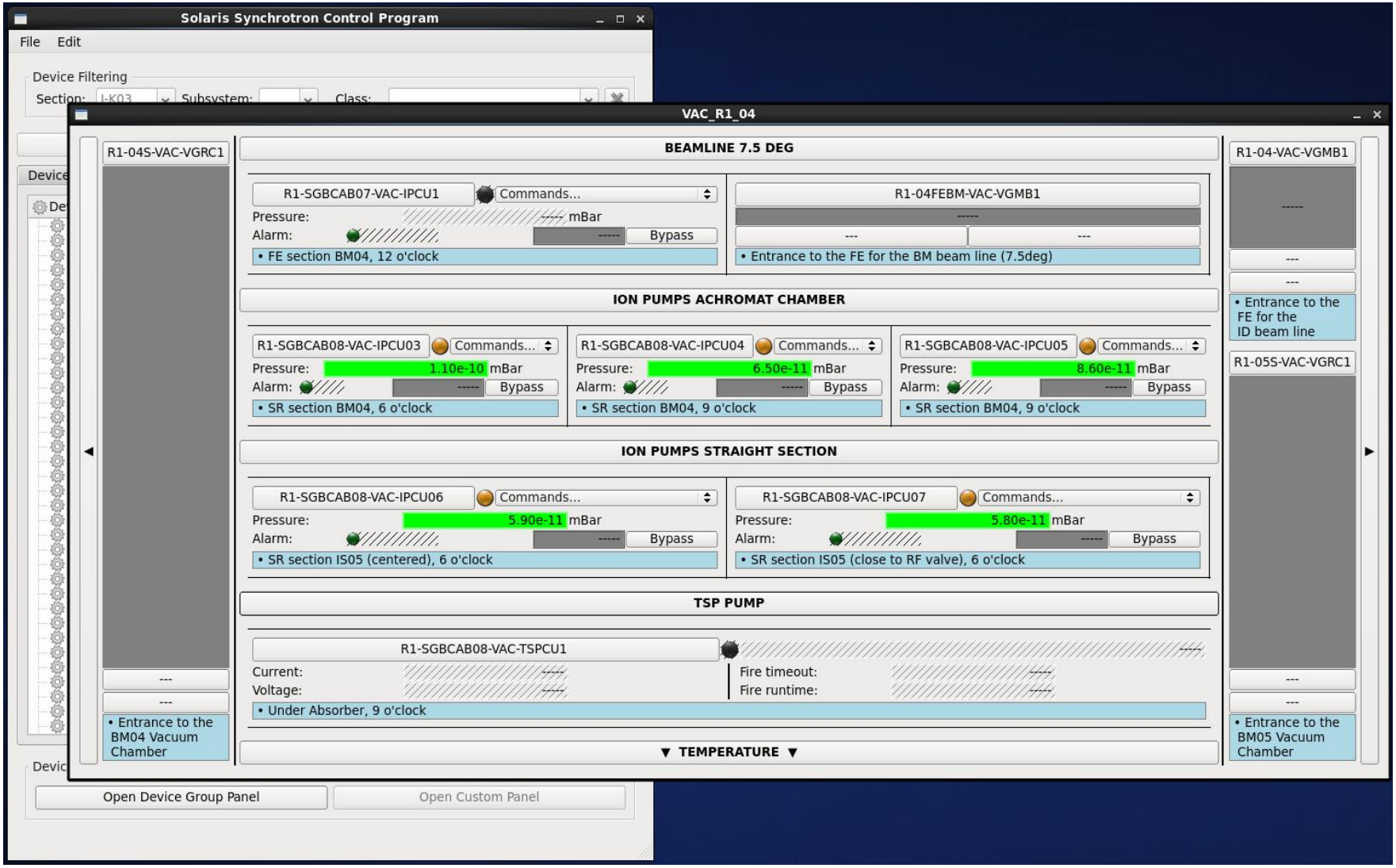
- **Features**
  - **Device Overview**
    - Taurus panels, specialized panels
    - Organized access, various filtering options
    - Browsing in respect to facility structure
  - **Custom generated panels**
    - User input, dynamic generation
  - **Device Groups**
    - Panels aggregating multiple devices
    - Easy operation using dedicated screens
    - Transparent overview of subsystems

Device Group Panels

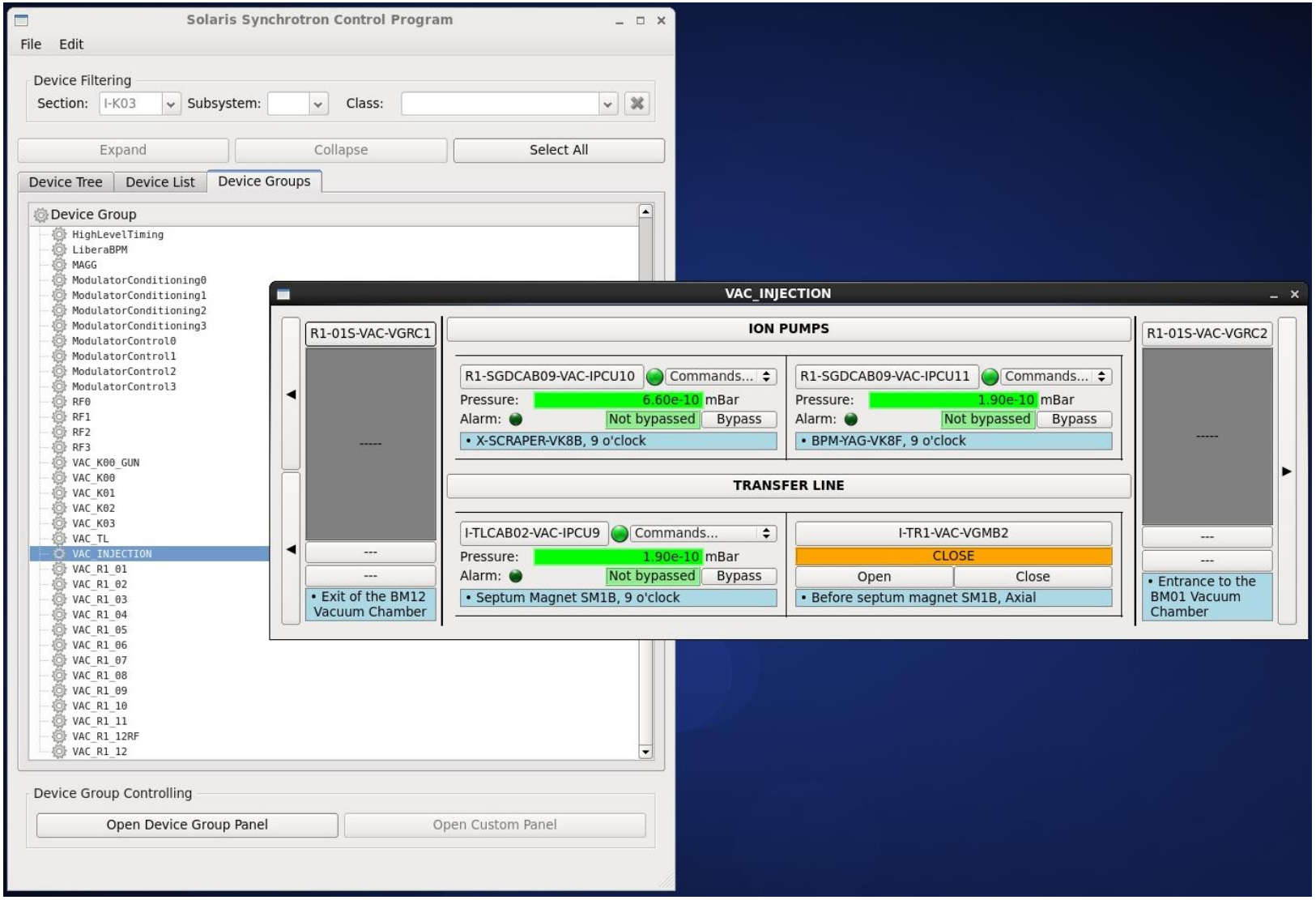


Device Group Panels

COSYLAB



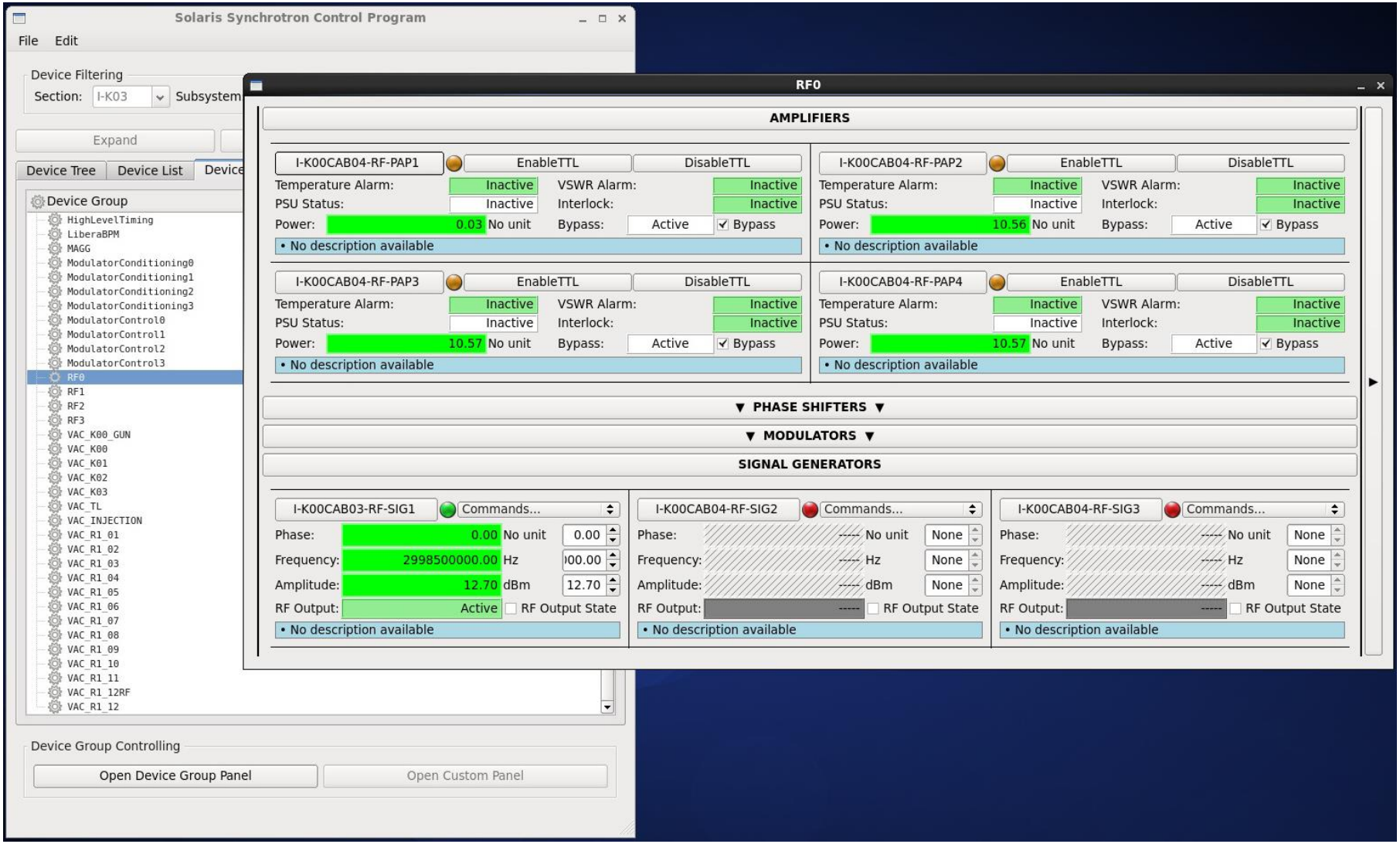
Device Group Panels



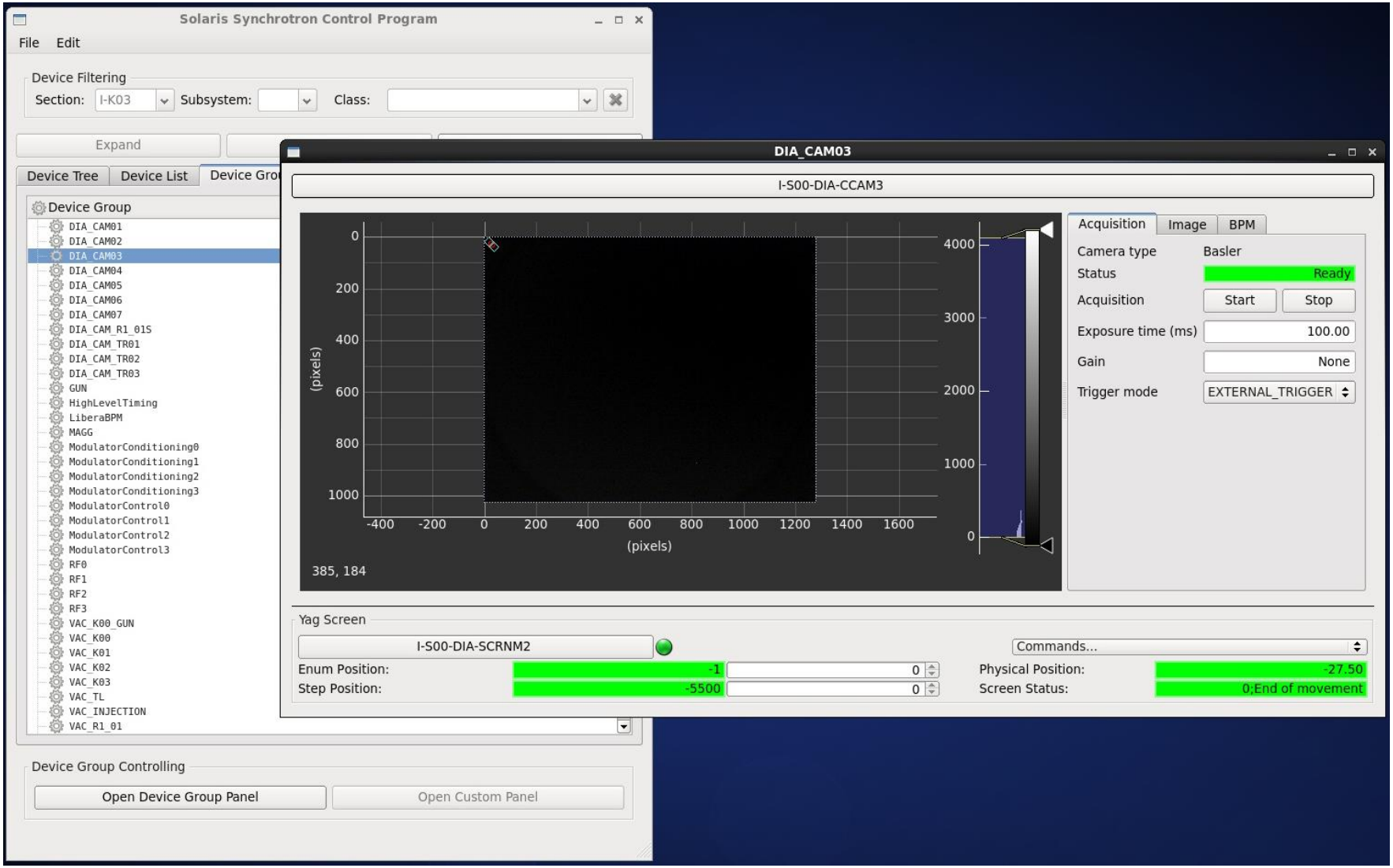
Device Group Panels

Device Group Panels

COSYLAB

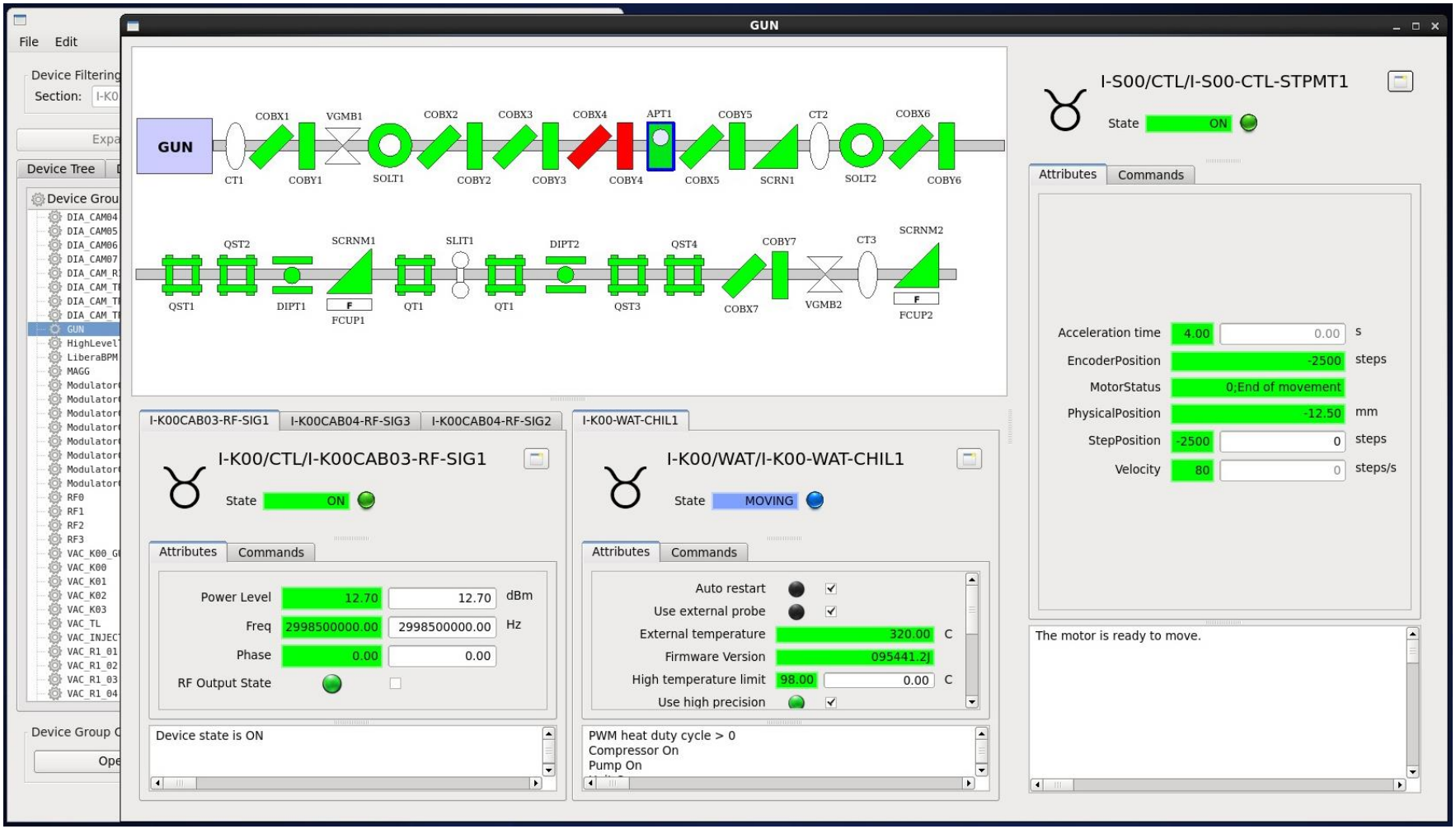


Device Group Panels



Device Group Panels

COSYLAB



Control Program Features

COSYLAB

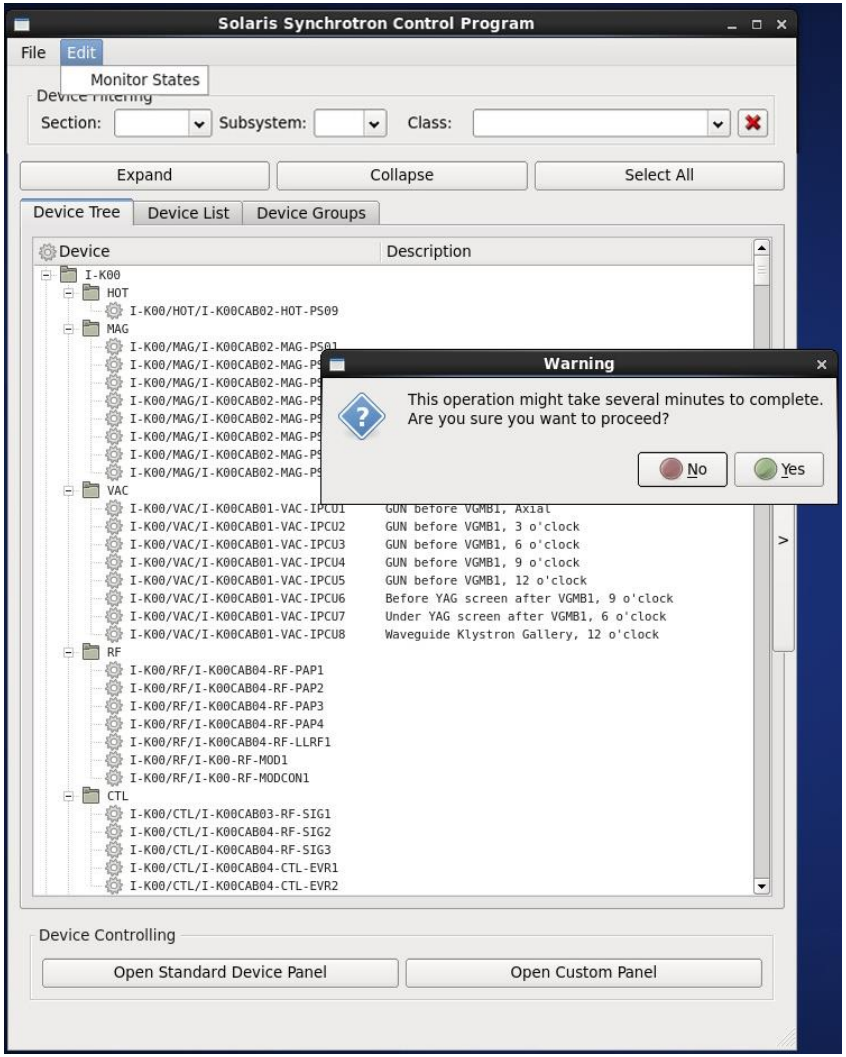
- **Features**
  - **Device Overview**
    - Taurus panels, specialized panels
    - Organized access, various filtering options
    - Browsing in respect to facility structure
  - **Custom generated panels**
    - User input, dynamic generation
  - **Device Groups**
    - Panels aggregating multiple devices
    - Easy operation using dedicated screens
    - Transparent overview of subsystems

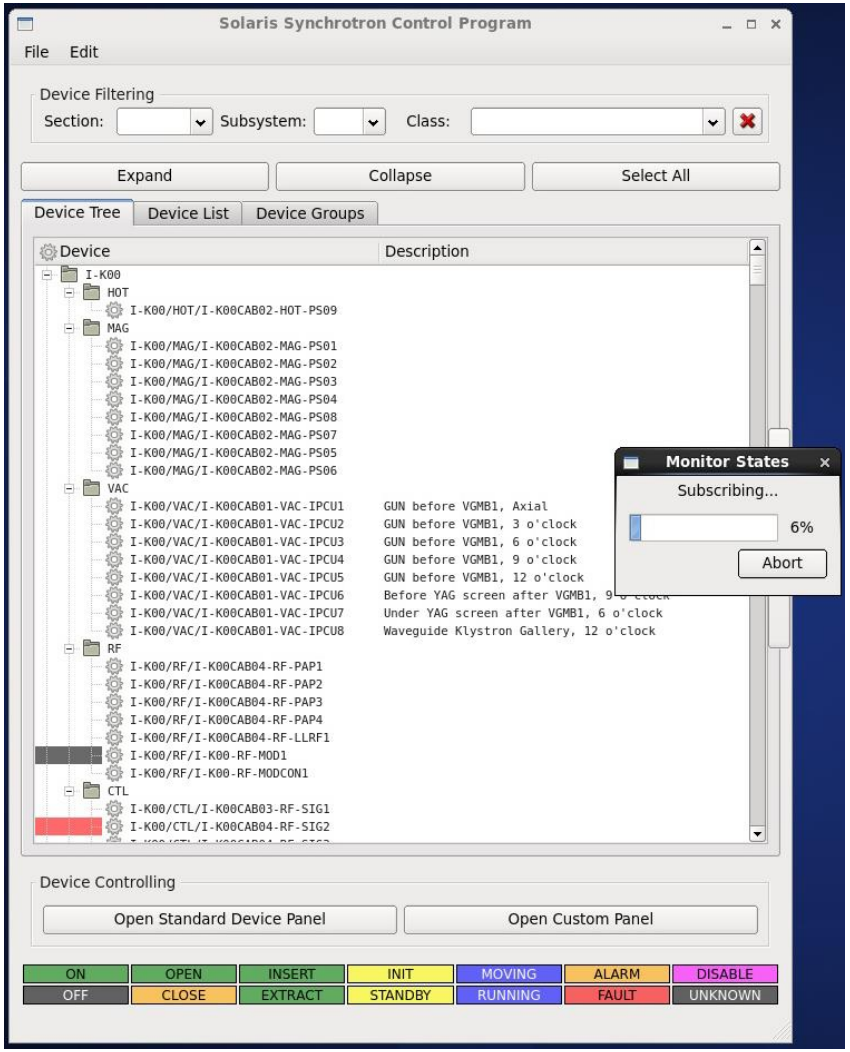
Control Program Features

COSYLAB

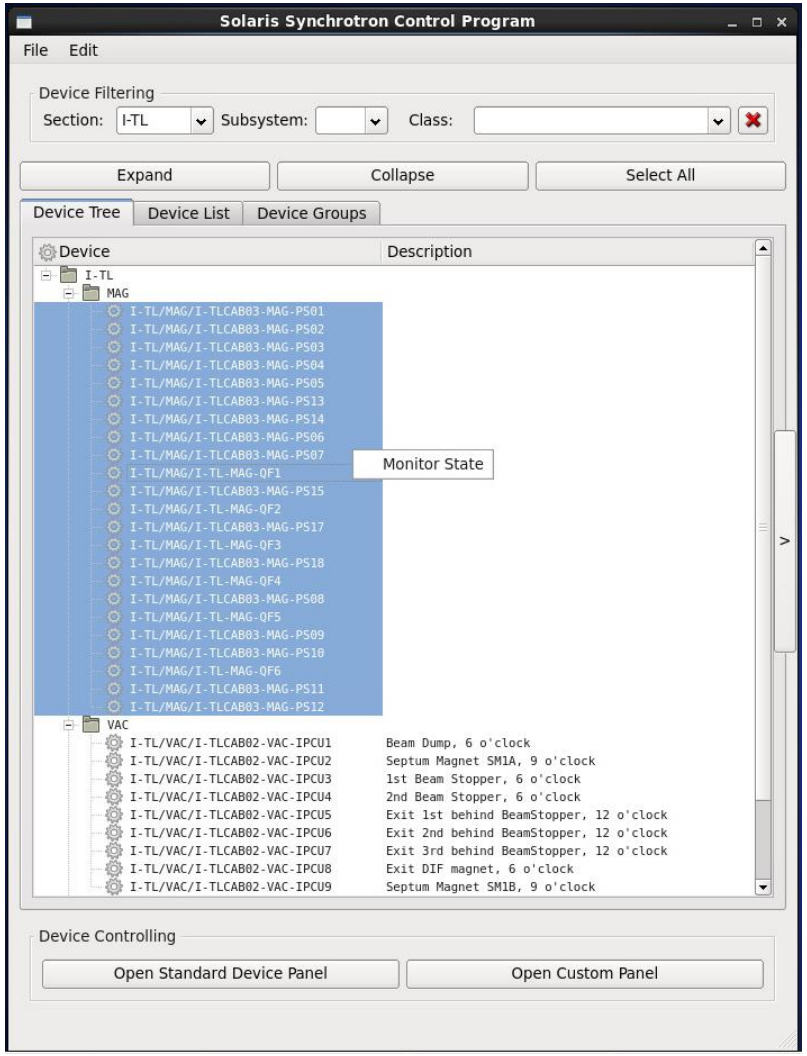
- **Features**
  - **Device Overview**
    - Taurus panels, specialized panels
    - Organized access, various filtering options
    - Browsing in respect to facility structure
  - **Custom generated panels**
    - User input, dynamic generation
  - **Device Groups**
    - Panels aggregating multiple devices
    - Easy operation using dedicated screens
    - Transparent overview of subsystems
  - **Device State Monitoring**
    - Full or selective

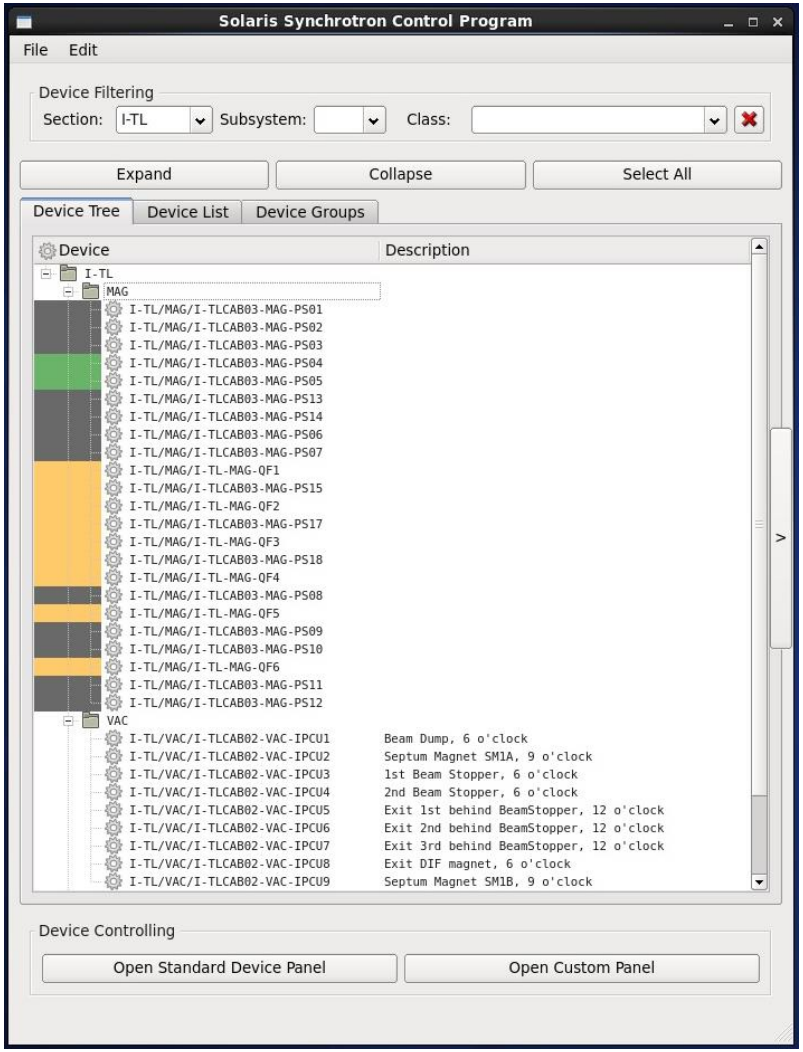
Device State Monitoring





Device State Monitoring





Control Program Features

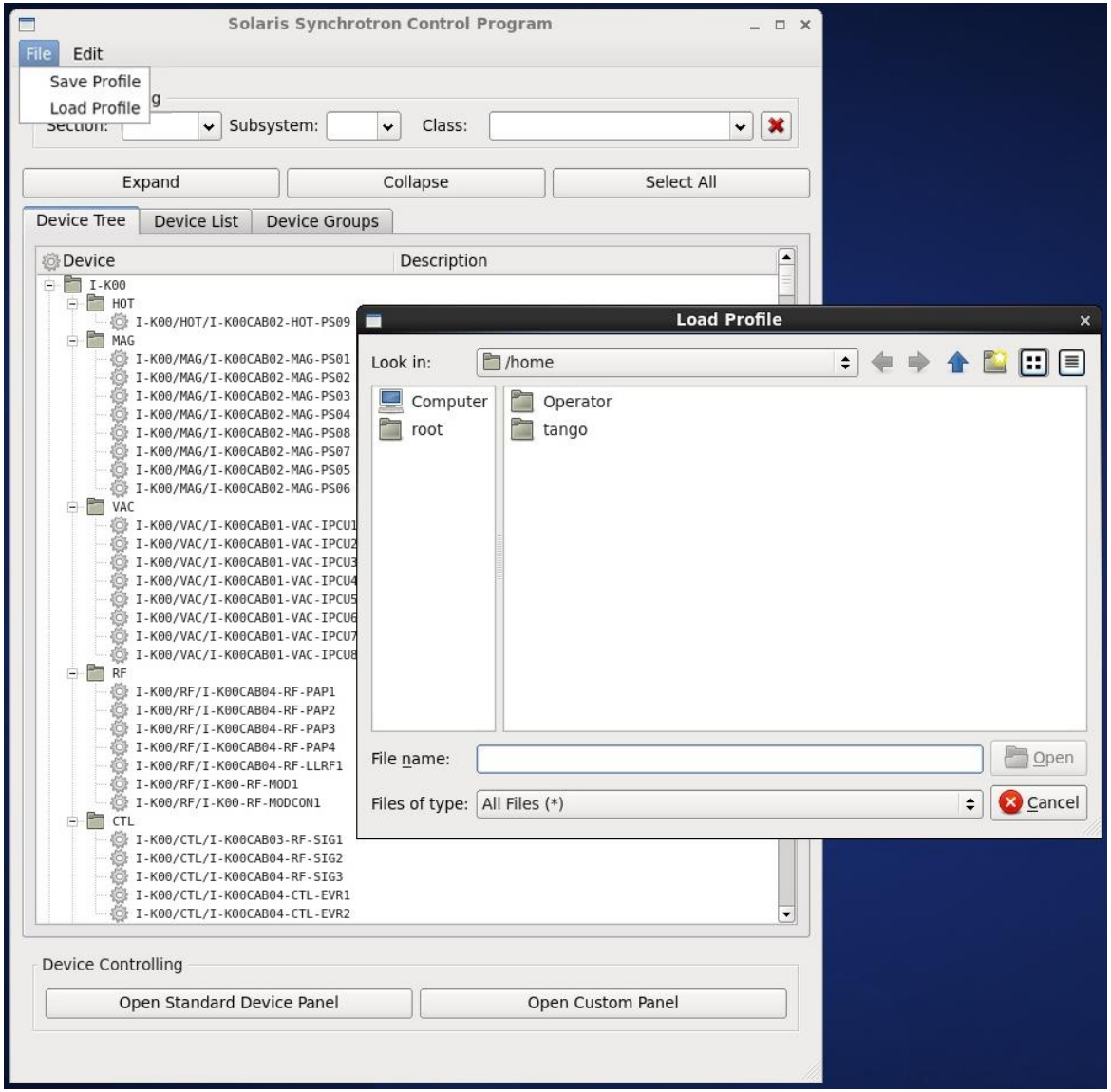
COSYLAB

- **Features**
  - **Device Overview**
    - Taurus panels, specialized panels
    - Organized access, various filtering options
    - Browsing in respect to facility structure
  - **Custom generated panels**
    - User input, dynamic generation
  - **Device Groups**
    - Panels aggregating multiple devices
    - Easy operation using dedicated screens
    - Transparent overview of subsystems
  - **Device State Monitoring**
    - Full or selective

Control Program Features

- **Features**
  - **Device Overview**
    - Taurus panels, specialized panels
    - Organized access, various filtering options
    - Browsing in respect to facility structure
  - **Custom generated panels**
    - User input, dynamic generation
  - **Device Groups**
    - Panels aggregating multiple devices
    - Easy operation using dedicated screens
    - Transparent overview of subsystems
  - **Device State Monitoring**
    - Full or selective
  - **Profile Management**

Profile Management



In Restrospect

COSYLAB

Benefits

- Single entry point for control room operations
- Transparent usability
- Controlled content

Maintenance

- Updates / transitions
- Scripted deployment of updates

Reusability

- Configuration files
- Optional extensions library

Extensibility

- Dedicated templates
- Support for external applications

Future development

- Operator/expert mode
- Archiving support
- State monitoring on subsystem level
- Automatic synoptic generation
- ...

THANK YOU!

COSYLAB

Vid Juvan

Vid.juvan@cosylab.com

Your TRUSTED Control System Partner

COSYLAB