Dynamic Control Room Interfaces

for Complex Particle Accelerator Systems

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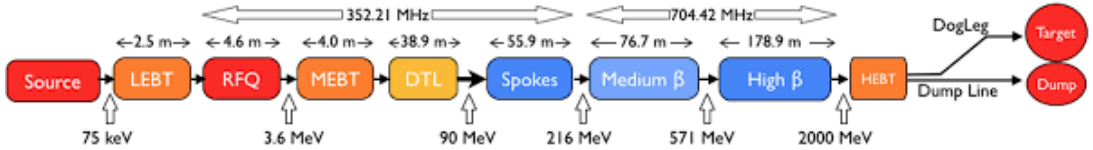
Challenge

Large-scale particle accelerators

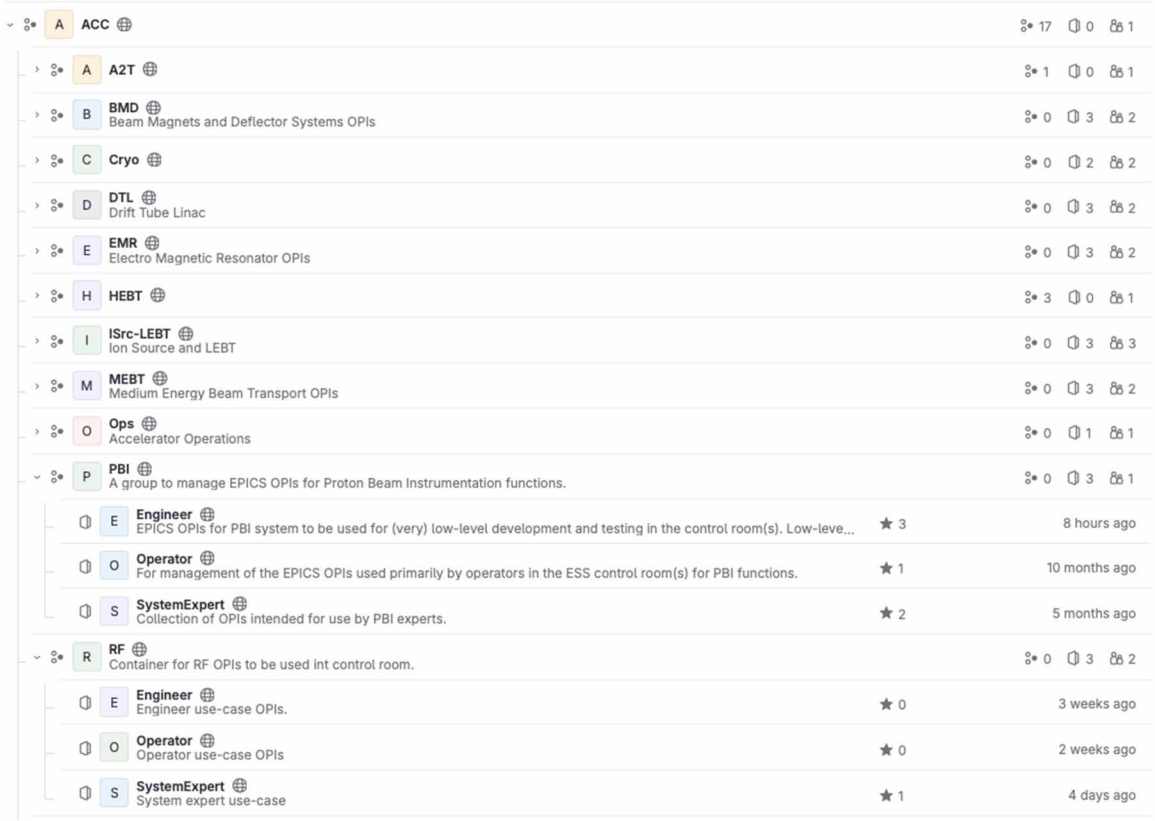
- Complex machinery = multiple challenges designing GUIs
- Many unique sub-systems
- Phoebus OPIs
  - XML-structured files
- Dynamic construction of OPIs
  - Input: Developer/user-provided
  - Dynamic construction based on input via scripts
  - Output: Ready OPI
    - Dynamically constructed
    - Static whilst being used
- Runtime-dynamic OPIs



Dynamic construction of OPIs

XML-files (.bob) generated via scripts

- Navigator OPI
  - Motivation



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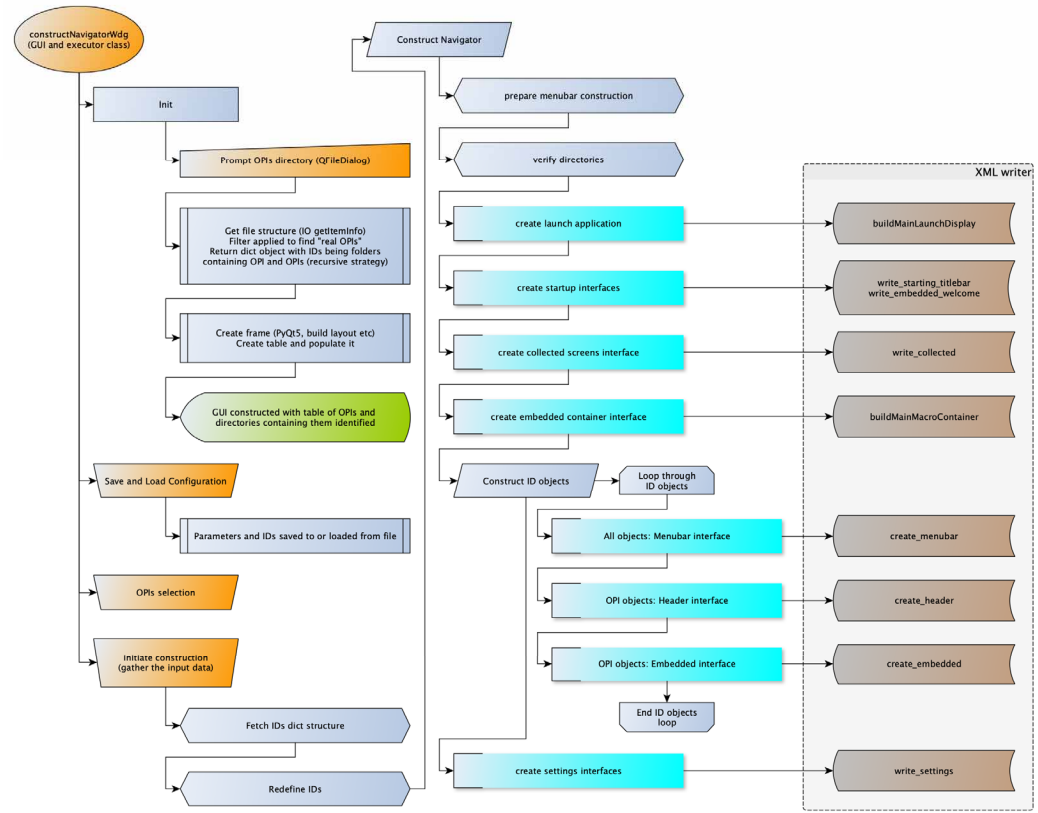

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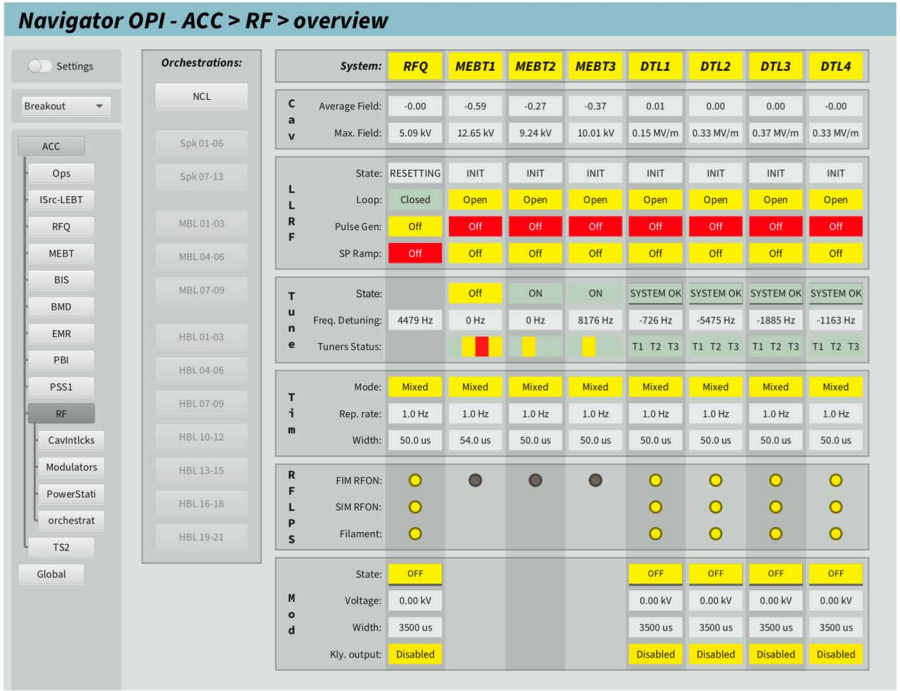

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baseline ess-lattice / CSV_Tables / TARGET / elements.csv Find file Blame History Permalink

elements.csv 503.12 KiB Edit Lock Replace Delete

sect	cell	slot	disc	elem	index	doorsid	model	essname	len[mm]	r[mm]	s,s[mm]	BPS,s,x[mm]
								BPS	0.0	0.0	0.0	0.0
ISrc	010			Drf	001				70.0	50.0	0.0	0.0
ISrc	010			Drf	002				184.1	75.0	70.0	0.0
ISrc	010			Drf	003				219.0	50.0	254.1	0.0
LEBT	010			Drf	001				45.0	50.0	473.1	0.0
LEBT	010		PBI	d_z_mm=160	001			LEBT-010:PBI-d_z_mm=160-001	0.0	50.0	678.1	0.0
LEBT	010		BMD	Sol	001			LEBT-010:BMD-Sol-001	320.0	50.0	518.1	0.0
LEBT	010			Drf	002				192.8	75.0	838.1	0.0
LEBT	010			Drf	003				46.0	75.0	1030.9	0.0
LEBT	010			Drf	004				15.0	40.0	1076.9	0.0
LEBT	010			Drf	005				42.5	75.0	1091.9	0.0
LEBT	010			Drf	006				15.0	37.0	1134.4	0.0
LEBT	010			Drf	007				5.0	75.0	1149.4	0.0
LEBT	010			Drf	008				15.0	37.0	1154.4	0.0
LEBT	010			Drf	009				11.5	75.0	1169.4	0.0
LEBT	010		PBI	Iris	001			LEBT-010:PBI-Iris-001	0.0	75.0	1180.9	0.0
LEBT	010			Drf	010				33.5	75.0	1180.9	0.0
LEBT	010			Drf	011				15.0	37.0	1214.4	0.0
LEBT	010			Drf	012				101.5	75.0	1229.4	0.0
LEBT	010			Drf	013				96.0	75.0	1330.9	0.0
LEBT	010			Drf	014				20.0	40.0	1426.9	0.0
LEBT	010			Drf	015				27.5	40.0	1446.9	0.0
LEBT	010		BMD	Chop	001			LEBT-010:BMD-Chop-001	0.0	40.0	1474.4	0.0
LEBT	010			Drf	016				27.5	40.0	1474.4	0.0
LEBT	010			Drf	017				20.0	40.0	1501.9	0.0
LEBT	010			Drf	018				79.9	75.0	1521.9	0.0

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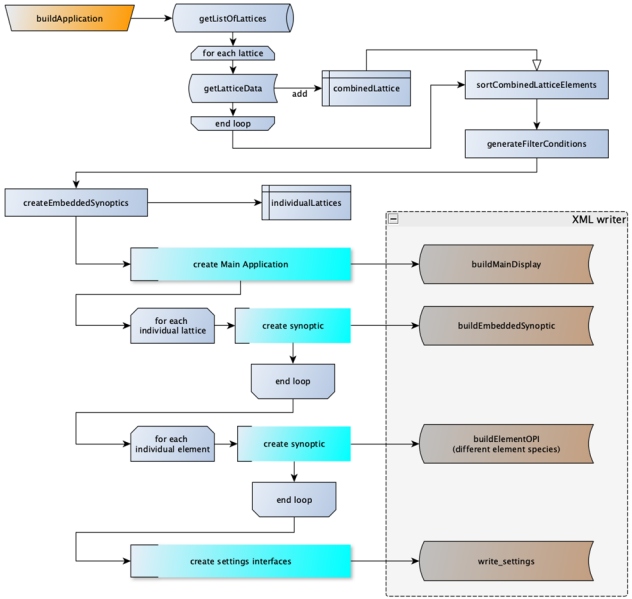

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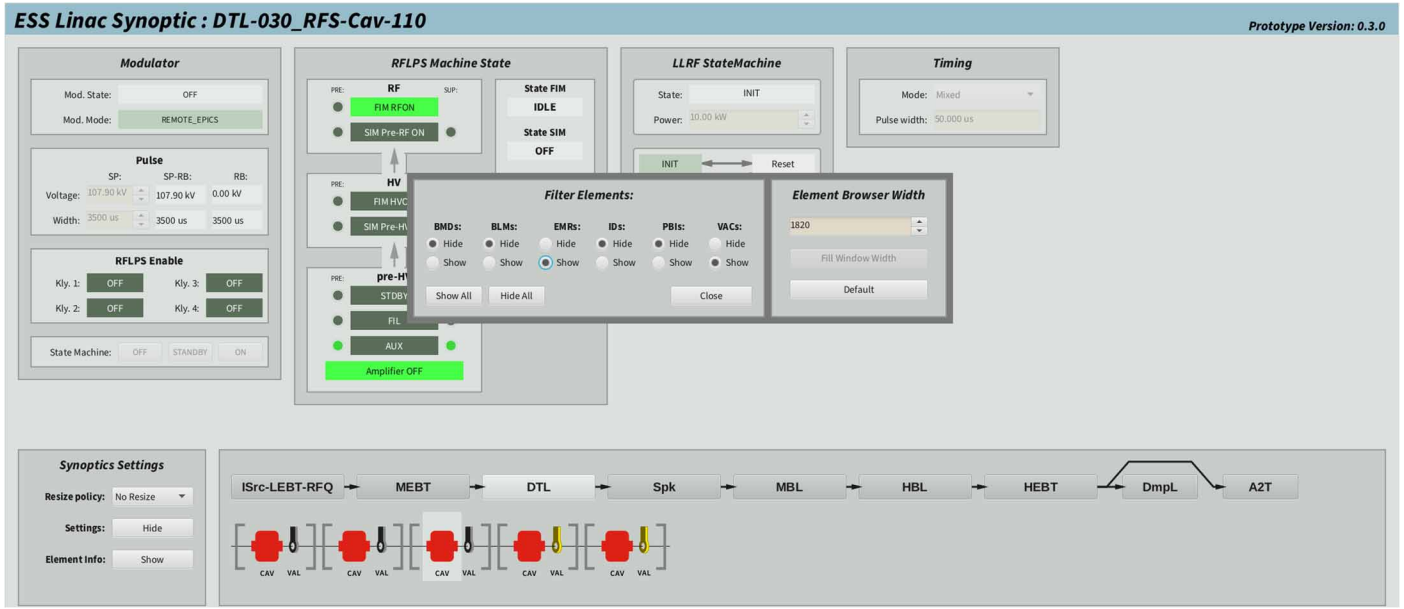

Runtime-dynamic OPIs

Dynamic configuration / setup

- Issues
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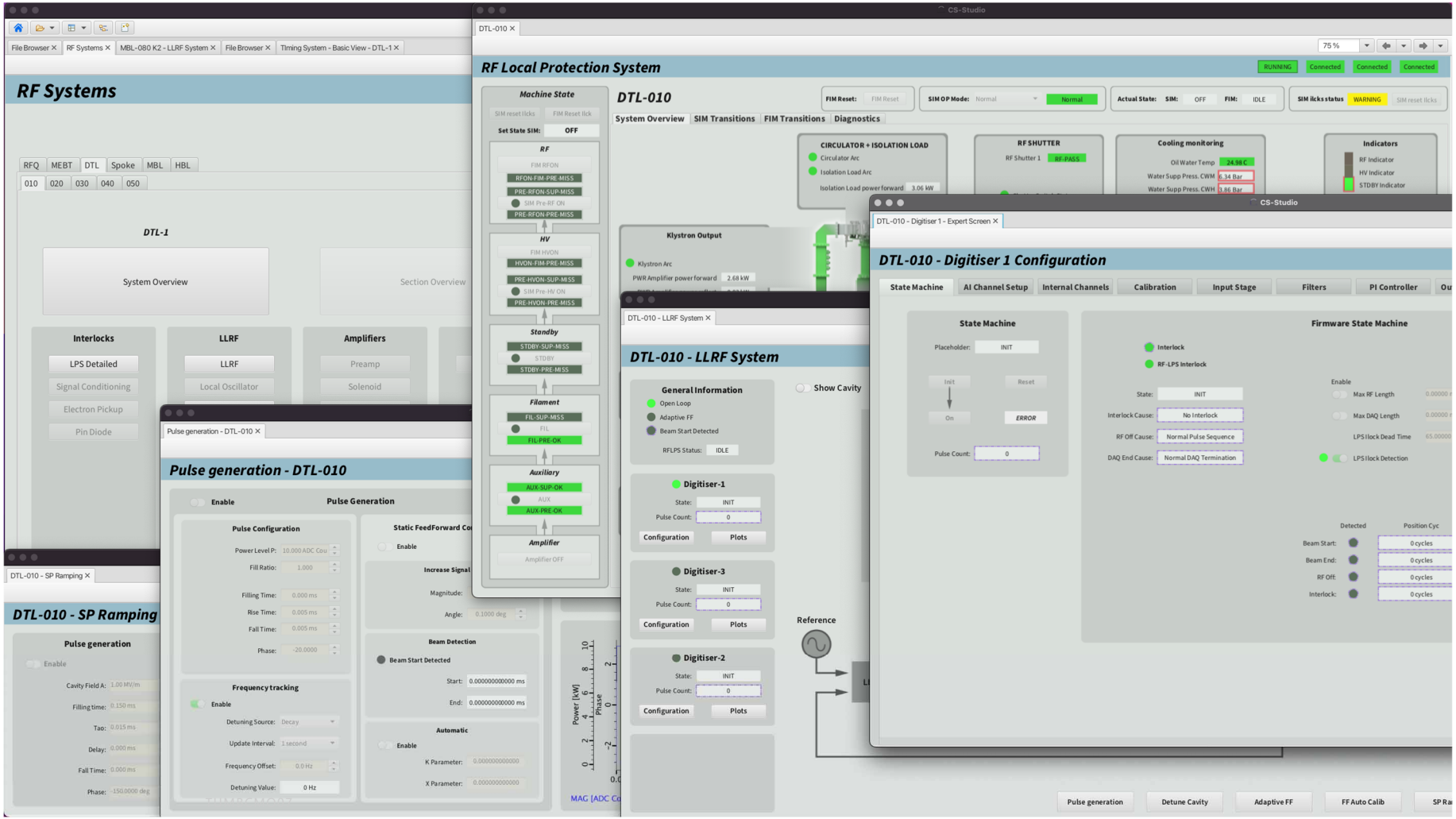
RF Systems
RFQ
MEBT
DTL
Spoke
MBL
HBL
010
020
030
040
050
DTL-1
System Overview
Section Overview
Interlocks
LPS Detailed
Signal Conditioning
Electron Pickup
Pin Diode
LLRF
LLRF
Local Oscillator
Amplifiers
Preamp
Solenoid
RF Local Protection System
DTL-010
Machine State
Set State SIM:
OFF
RF
HV
Standby
Filament
Auxiliary
Amplifier
System Overview
SIM Transitions
FIM Transitions
Diagnostics
CIRCULATOR + ISOLATION LOAD
RF SHUTTER
Cooling monitoring
Indicators
Klystron Output
Klystron Arc
PWR Amplifier power forward
DTL-010 - Digitiser 1 Configuration
State Machine
AI Channel Setup
Internal Channels
Calibration
Input Stage
Filters
PI Controller
Firmware State Machine
DTL-010 - LLRF System
General Information
Open Loop
Adaptive FF
Beam Start Detected
Show Cavity
Digitiser-1
Digitiser-3
Digitiser-2
Configuration
Plots
Reference
Pulse generation - DTL-010
Enable
Pulse Generation
Pulse Configuration
Frequency tracking
Beam Detection
Automatic
DTL-010 - SP Ramping
Pulse generation
Cavity Field A:
Filling time:
Tao:
Delay:
Fall Time:
Phase:
Pulse generation
Detune Cavity
Adaptive FF
FF Auto Calib

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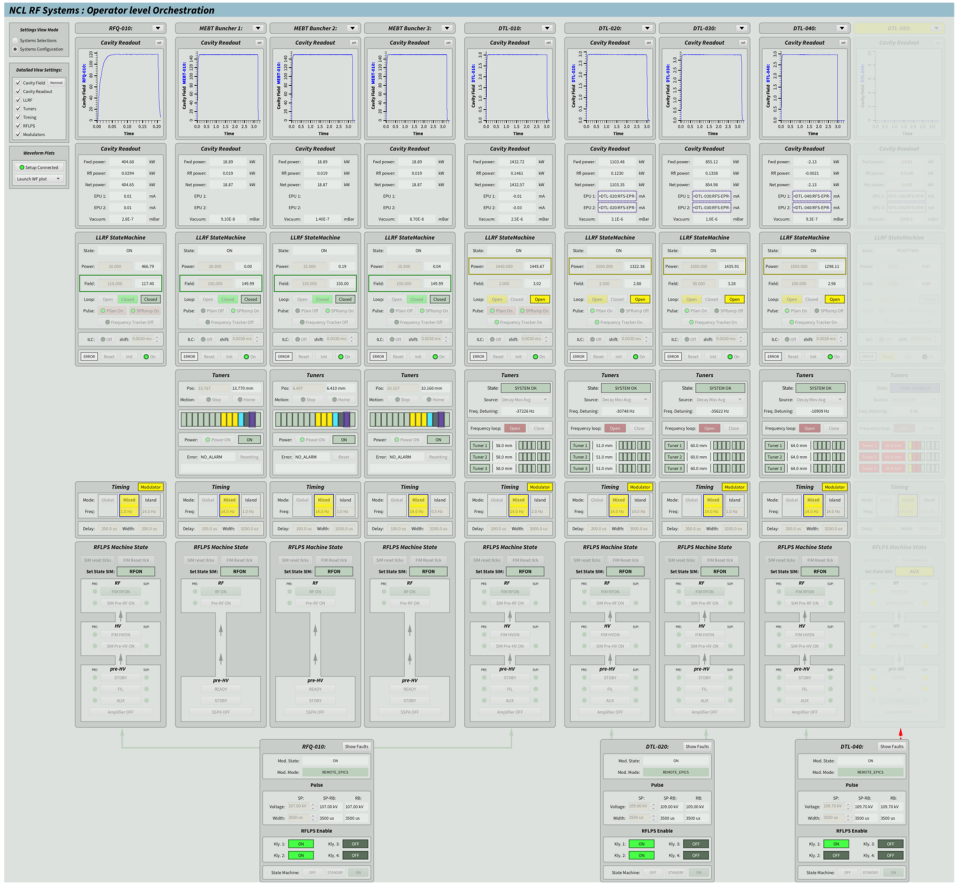
Dynamic configuration / setup

- Issues
  - A lot of OPIs needed open at the same time
  - Jungle to navigate between OPIs
- Solution
  - Extract needed controls and information
    - Still too much!
  - Configurable by end-user
  - Collapsable elements
    - Unused: Collapse



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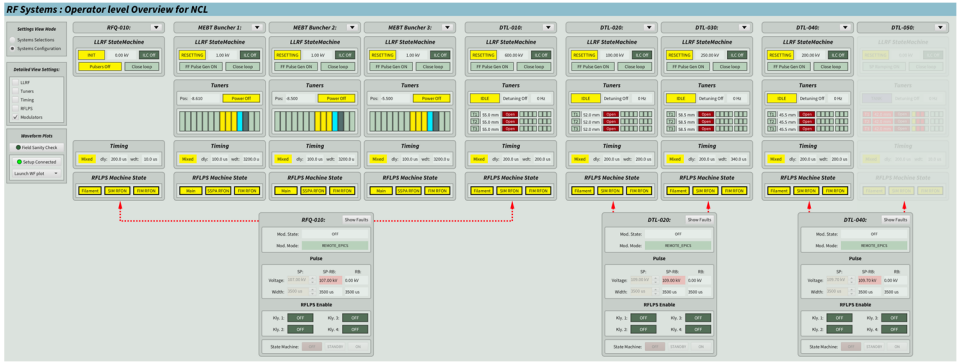

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    - Unused: Collapse
    - Used/needed: Expand
  - Virtual signals (loc-PVs)