




# State Machine Simulation

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# Goals of the Simulation

- The simulation should:
  - Recreate behavior of the PVs in each state
    - Focus Coil  Currently developing
    - Spectrometers
    - Beamline
  - Model error conditions
- The simulation should/is not:
  - Monte Carlo
  - Impose state specific conditions
  - A full physics simulation

# Preparation

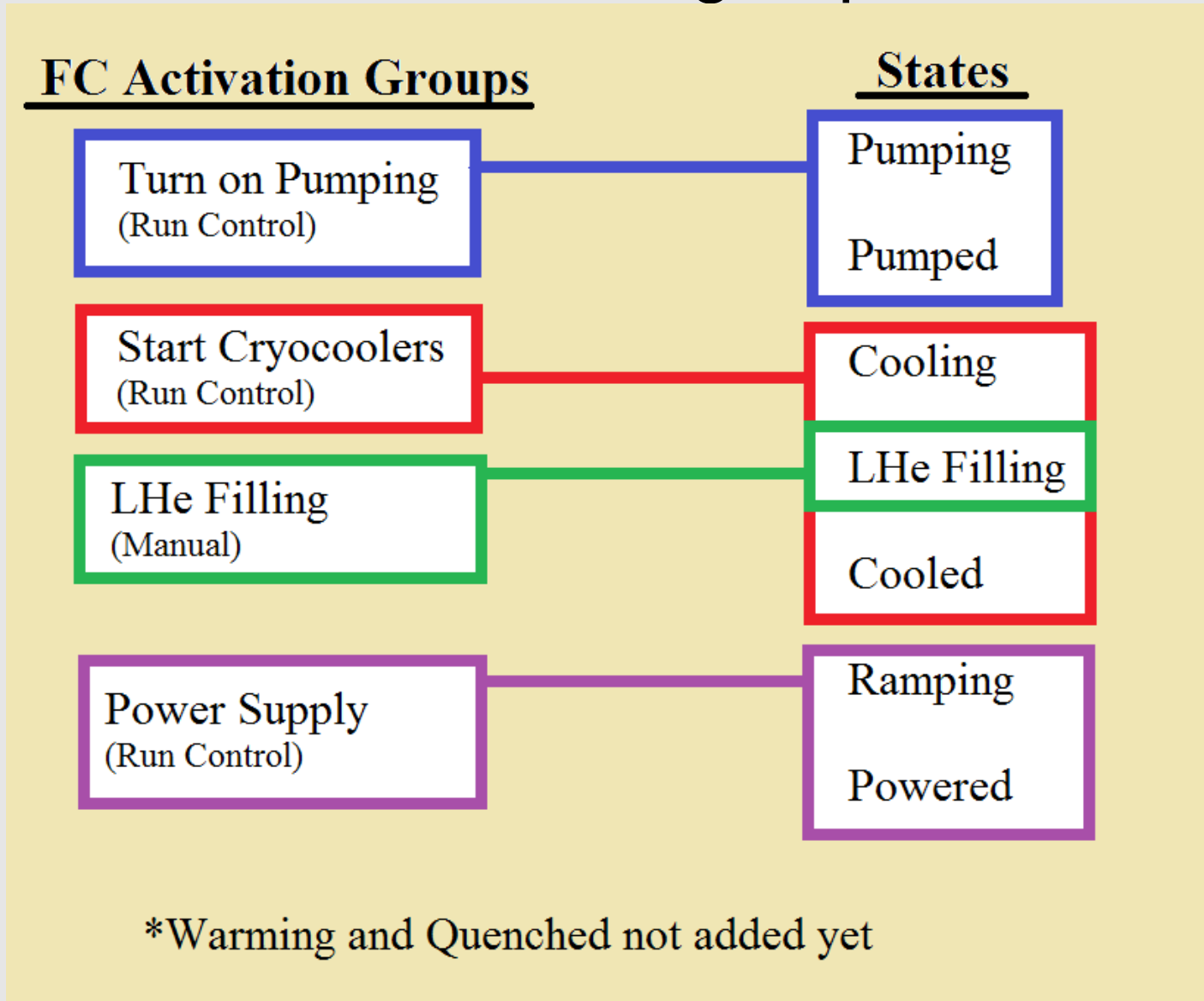
- Determine the states and PVs that the State Machine will monitor.
  - Come from conversations with working groups
- Convert PV list into usable files
  - Python parser converts .csv lists into:
    - IOC PV database
    - state machine specific archiver
    - alarm handler

Example of some Focus Coil SM PVs

FC2	PV Name	Description
Powered	MICE-FC2-VAC-01:RP	Insulating vacuum
	MICE-FC2-VAC-02:RP	Backing vacuum
	MICE-FC2-TS-01:RDGK	Bore of the cold mass
	MICE-FC2-TS-02:RDGK	Bottom of He channel at fill point.
	MICE-FC2-TS-03:RDGK	Upper cold-mass support 1st stage (Rad Shield)
	MICE-FC2-TS-04:RDGK	Lower cold mass support 1st stage (Rad Shield)
	MICE-FC2-TS-05:RDGK	Cryocooler #1 1st stage
	MICE-FC2-TS-06:RDGK	Cryocooler #1 2nd stage
	MICE-FC2-TS-07:RDGK	Cryocooler #2 1st stage
	MICE-FC2-TS-08:RDGK	Cryocooler #2 2nd stage
	MICE-FC2-TS-09:RDGK	HTS lead for coil#1 - warm end
	MICE-FC2-TS-10:RDGK	HTS lead for coil#2 - warm end
	MICE-FC2-TS-11:RDGK	HTS lead for coil#1 - cold end
	MICE-FC2-TS-12:RDGK	HTS lead for coil#2 - cold end
	MICE-FC2-TS-13:RDGK	HTS lead for coil#1 - warm end
	MICE-FC2-TS-14:RDGK	HTS lead for coil#2 - warm end
	MICE-FC2-TS-15:RDGK	HTS lead for coil#1 - cold end
	MICE-FC2-TS-16:RDGK	HTS lead for coil#2 - cold end
	MICE-FC2-TS-17:RDGK	1st stage platform for cooler sock 1
	MICE-FC2-TS-18:RDGK	2nd stage platform for cooler sock 1
	MICE-FC2-TS-19:RDGK	1st stage platform for cooler sock 2
	MICE-FC2-TS-20:RDGK	2nd stage platform for cooler sock 2
	MICE-FC2-CC-01:STA	Cryo Compressor 1: status
	MICE-FC2-CC-02:STA	Cryo Compressor 2: status
	MICE-FC2-MAG-HEP-01:RP	Cold mass pressure

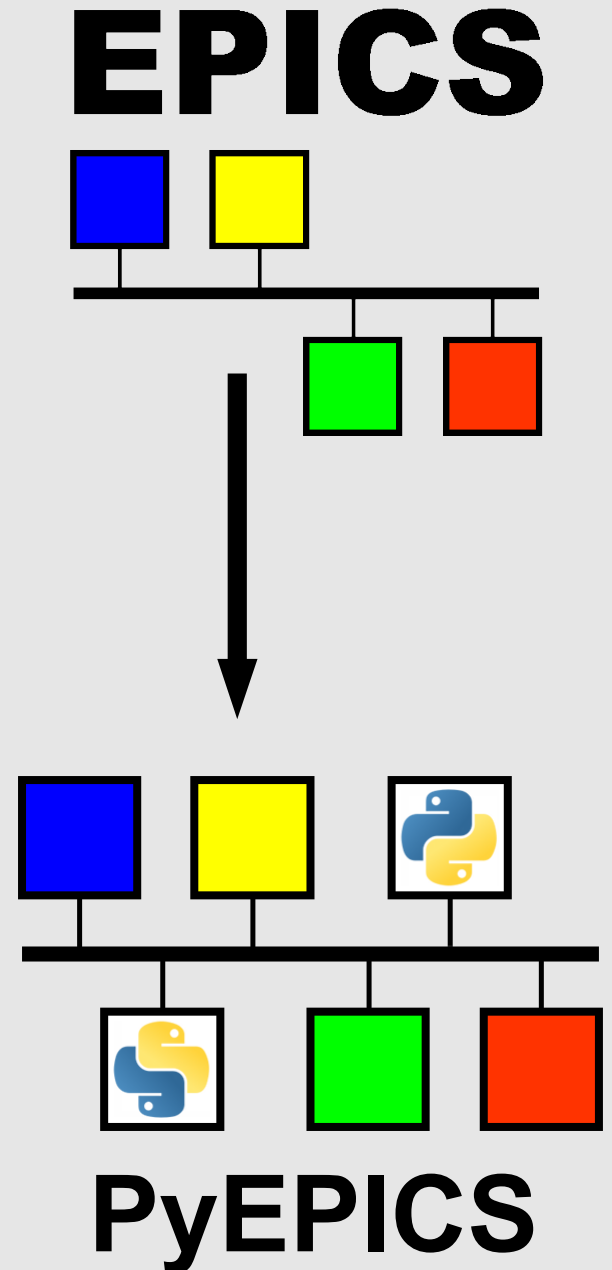
# Preparation

Sorting states into activation groups



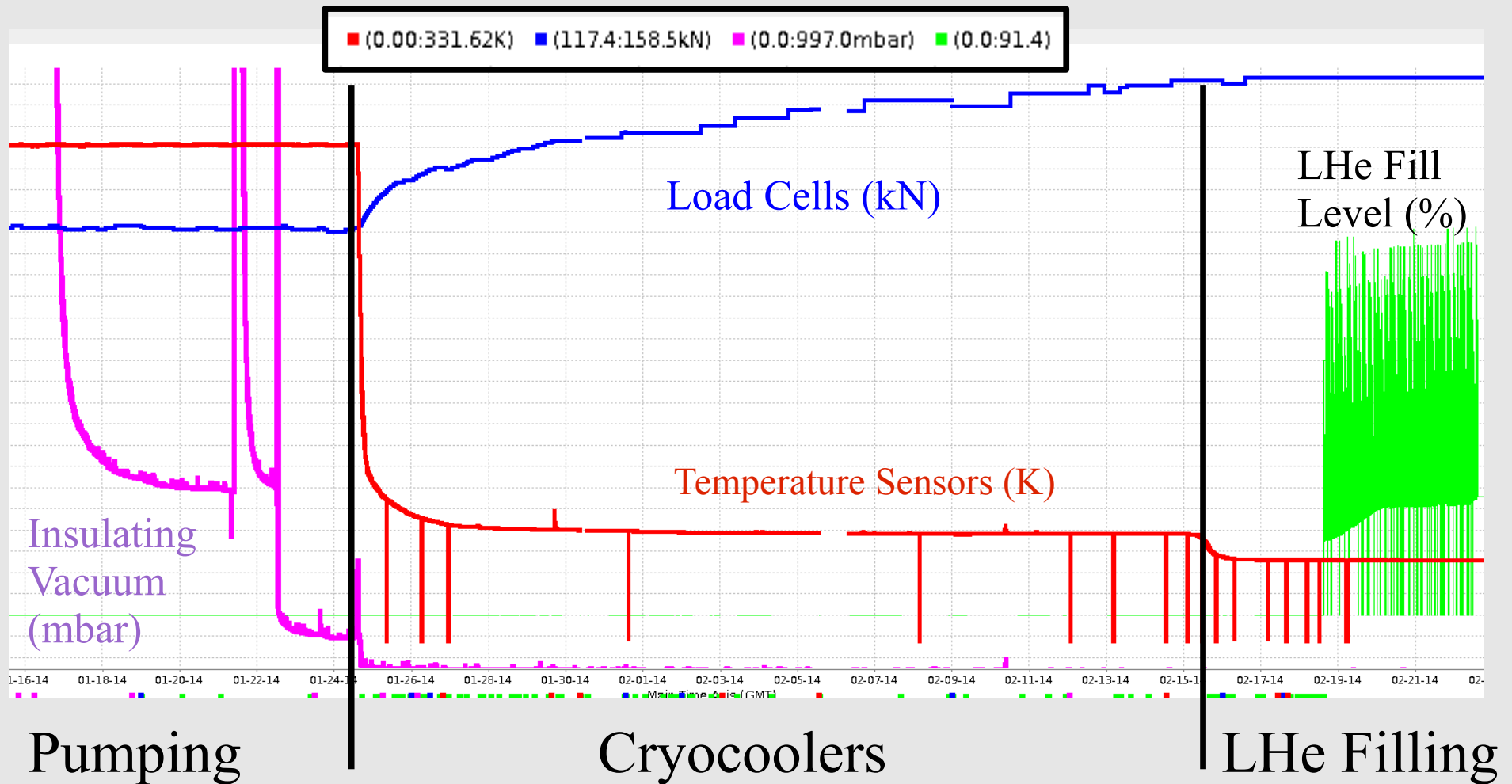
# Writing the Simulation

- Design philosophies
  - Done within EPICS
    - Benefit: Trivial to integrate into C&M system
    - Drawback: EPICS does not do random
      - Could come back and bite us when trying to do error testing
  - Activated from Control PVs
    - No Simulation specific menus
      - Exception for the case where there is no electronic control
    - Activation groups toggled or set as if in Control Room
      - Simulation PVs set ramping speeds and floor/ceiling values.



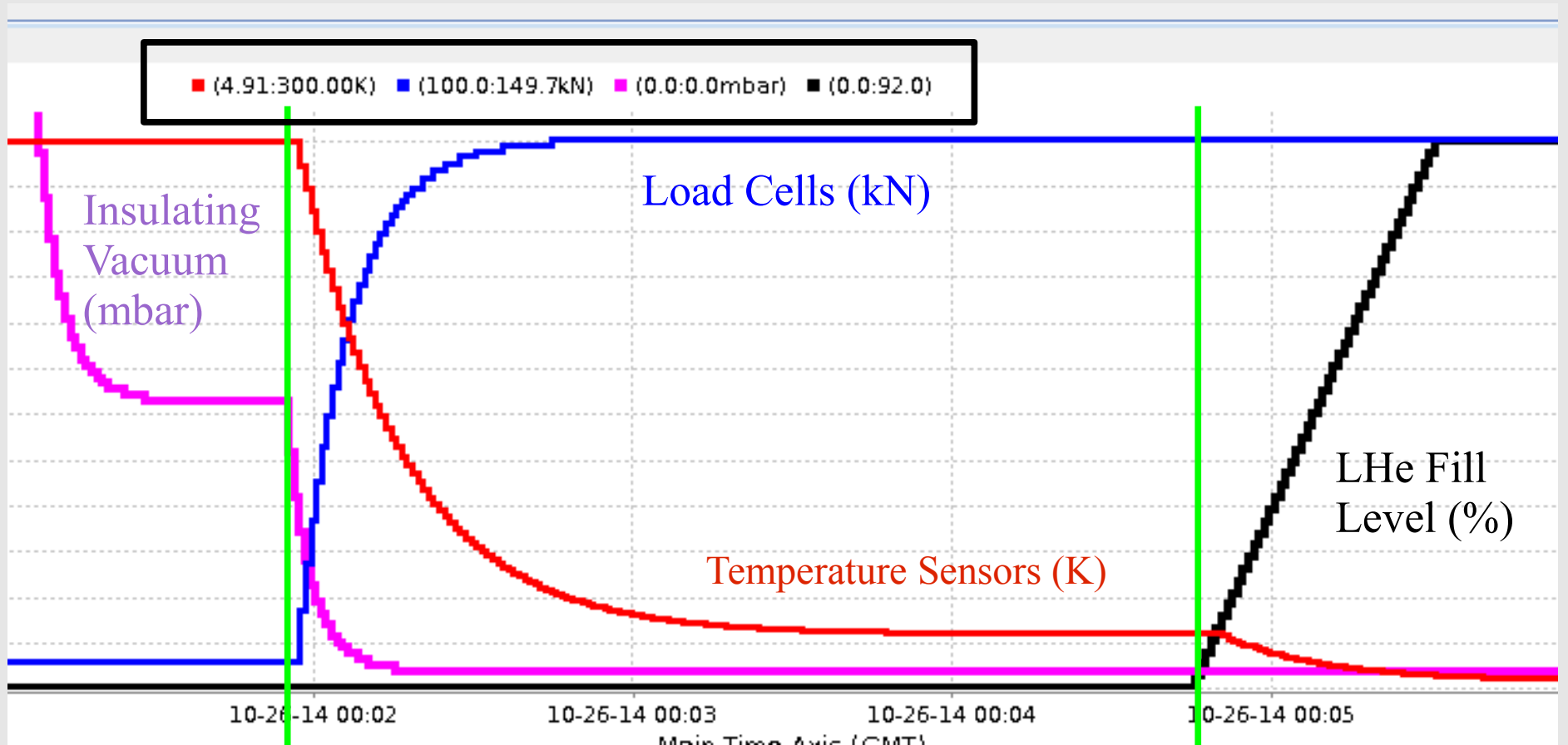
# Data

# Early Results



# Sim

# Early Results



Pumping

Cryocoolers

LHe Filling

# Conclusion

- Early progress is promising
- Work ongoing with the Focus Coil powering states
- Need access to more Focus Coil data about error states
  - Probably need access to more sophisticated tools than EPICs
- Could really use more data for Warming and Quenched states