Finite State Machine for the Luminosity Detector

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Motivation

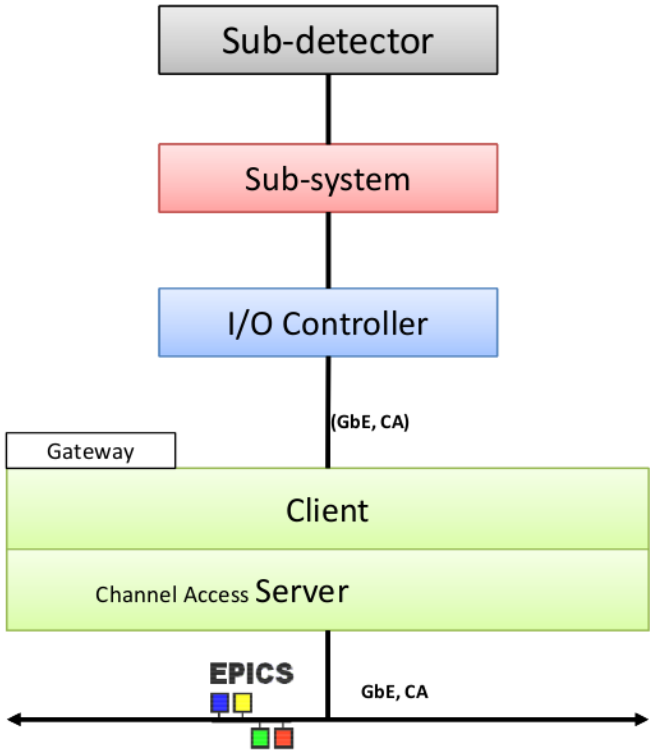
- Supervisory layer will send simple commands to sub detectors (e.g. "Get Ready for Physics")
- Sub detector should react with defined actions to commands

$\Rightarrow$ Using Finite State Machine

- Simple commands translated into state transitions

General Remarks

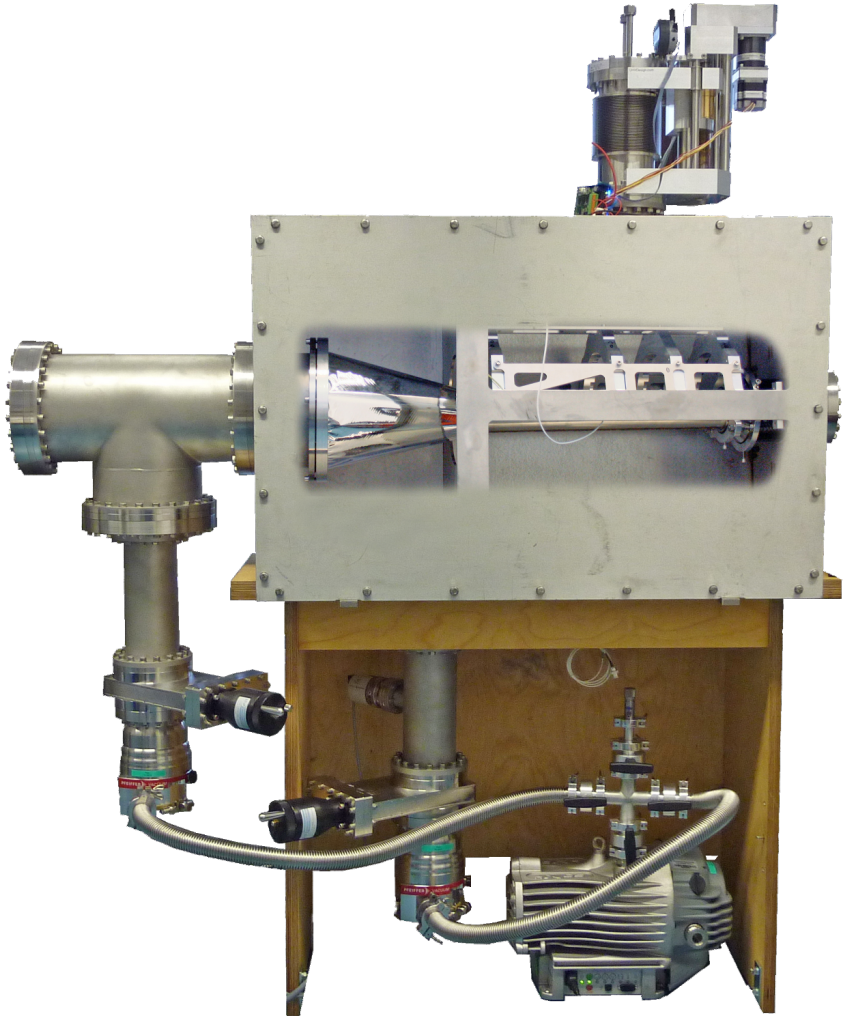
- Detectors should give feedback about their current state to supervisory layer
- Supervisory layer and control layers are seperated by CA gateway
- One way connection!
- Each sub detector needs a PV storing the command
- Supervisory layer uses CA-put to distribute CMD to sub detecotrs



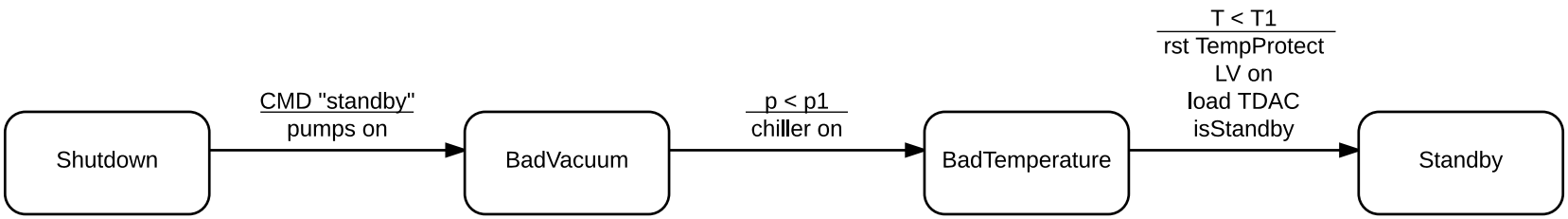
Luminosity Detector

- Tracking detector
- Four planes of HV-MAPS
- Retractable detector halfs
- Two vacuum compartments: Box and inner beam pipe
- Common fore pump
- Electronics cooled down to $-20\,^{\circ}\mathrm{C}$
- Measuring elastic scattered $\bar{p}$ between 3 to 8 mrad

Mechanical prototype

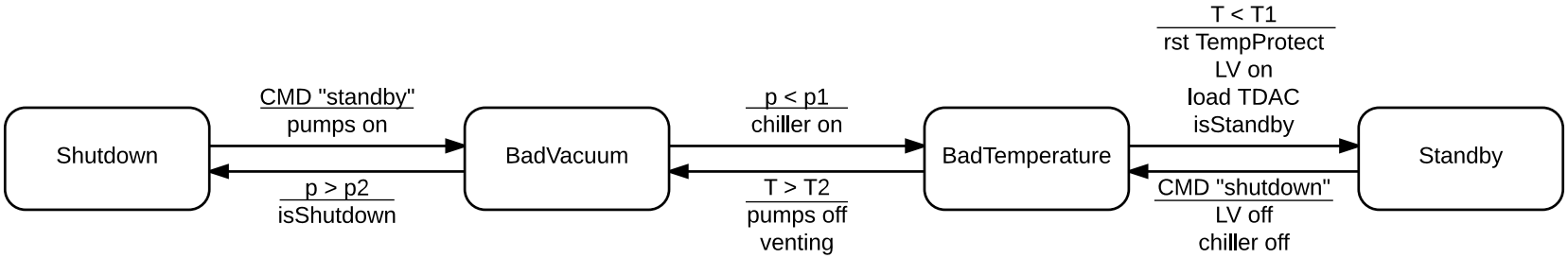


Transition Shutdown to Standby



- Starting from state "Shutdown"
  i.e. everything is off, no vacuum
- Intermediate states:
  BadVacuum: pressure too high (values to HESR closed)
  BadTemperature: pressure ok, but temperature too high
- Transition Shutdown $\rightarrow$ Standby: about 2.5 weeks

Transition Shutdown to Standby



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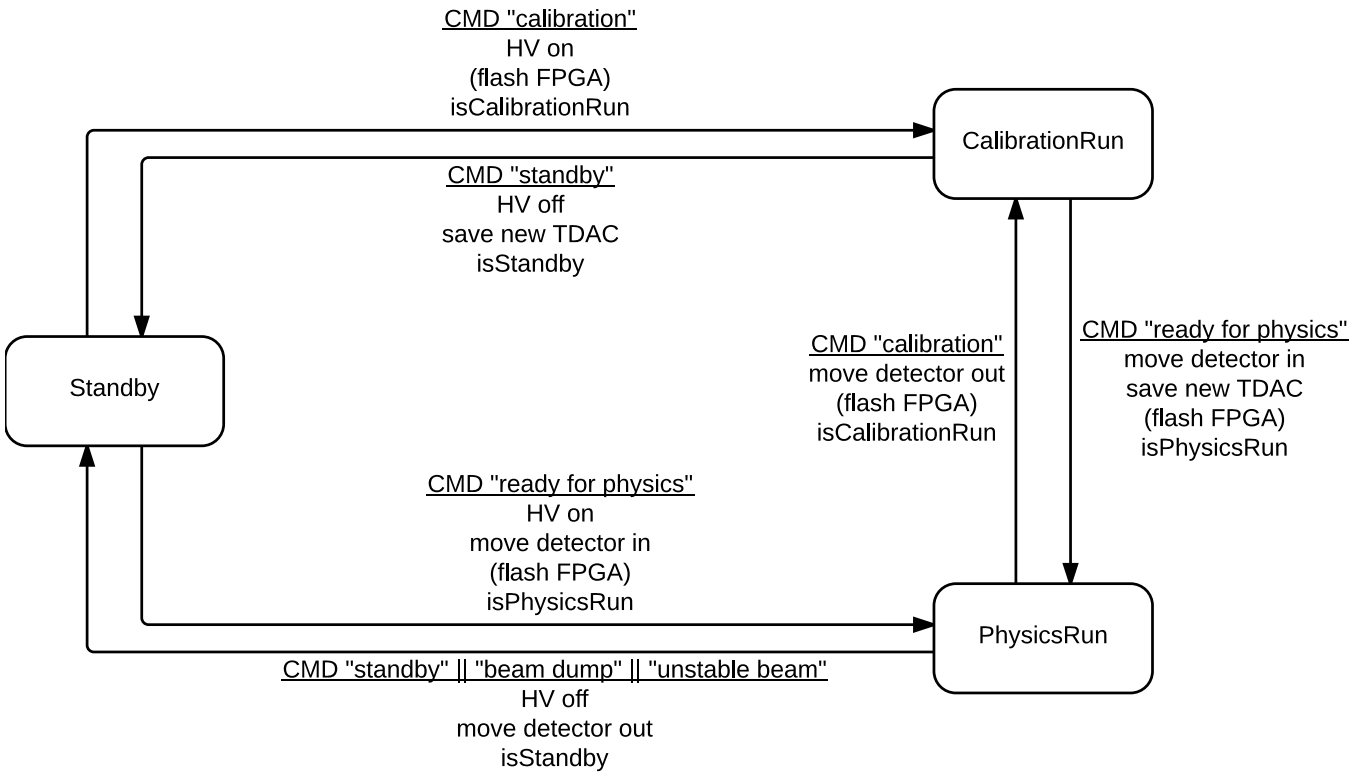
- Transition Standby $\rightarrow$ Shutdown: $\sim 2\,\mathrm{h}$

Transition Standby to Physics Run



- Transition Standby/Calibration $\rightarrow$ Physics Run: $\sim 1\,\text{min}$
- Concern: Need different firmwares for calibration and physics runs
- If FPGAs need to be flashed: $\sim 4\,\text{min}$

Summary

- General scheme of finite state machine for LMD ready
- Four main states: Shutdown, Standby, PhysicsRun, Calibration
- Estimated time needed for state transitions with mechanical prototype
- Transition Standby $\rightarrow$ PhysicsRun takes up to 4 min if FPGAs need to be flashed