RunCtrl and DCS-FEE-Interface for MuPix Telescope

PANDA Collaboration Meeting 19/3

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Run Control

- Part of ECS
- Commands distributed to DAQ and DCS
- Defined process of operating detector
- Use Finite State Machine (FSM) to power detector up, prepare for data taking, . . .

DCS-FEE-Interface

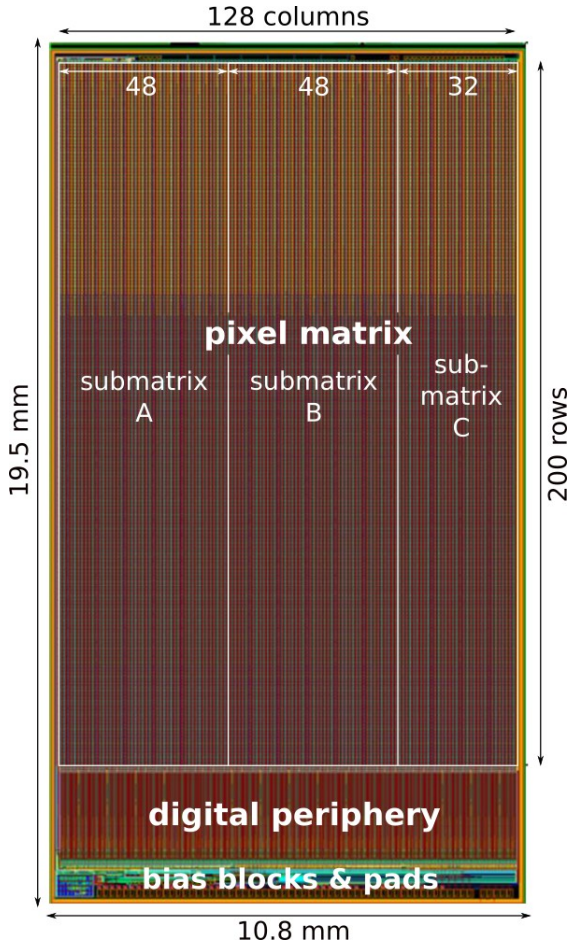
- Part of FSM is configuration of FEE
- Should be triggered by EPICS
- EPICS not made for large data throughput

$\Rightarrow$ “External” program needed

- Configuration data should be fetched from Configuration Database
- Transmitted via SODAnet to FEE

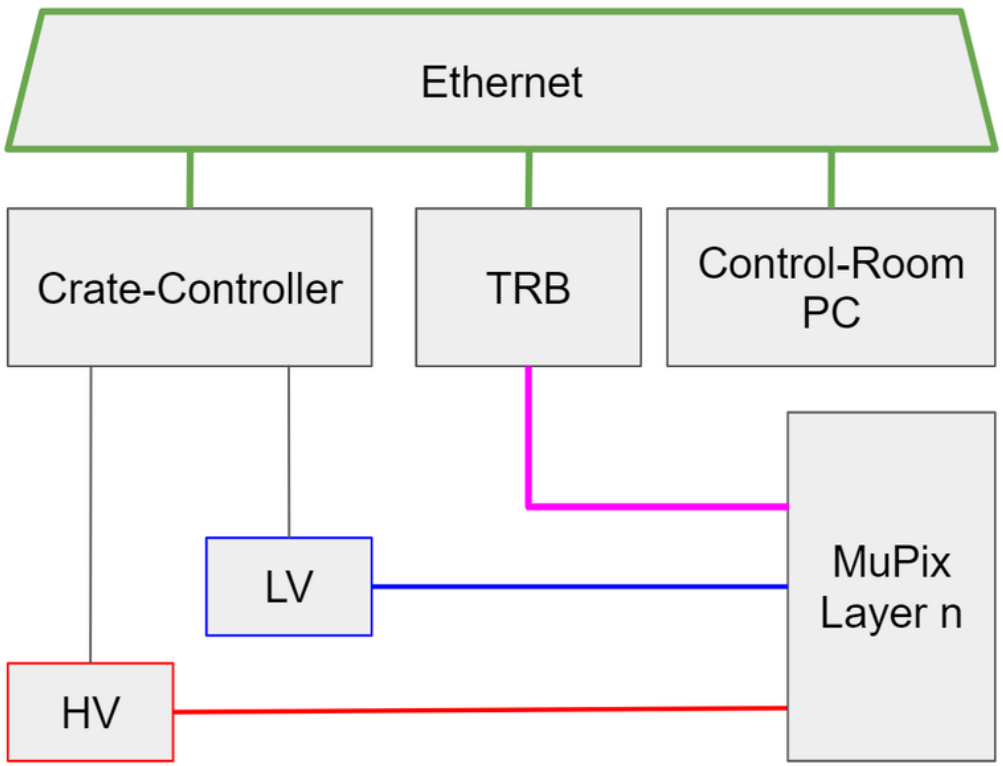
The MuPix 8 Chip

- Originally developped for Mu3e
- Physical size: $10.8 \times 19.5\text{mm}^2$
- Active area: $\sim 10.2 \times 16.2\text{mm}^2$
- Matrix: 128×200 Pixels, three Submatrices
  MatA: source follower
  MatB/C: current mode
- Pixel: $80 \times 81\mu\text{m}^2$
- Charge sensitive amplifier in each pixel
- 4 LVDS links (each submatrix + select/mux)
- Configuration via ~ 2 kbit bitstream per row



Beamtests with MuPix Telescope

- Testbeam in September 2019
- Four MuPix8 chips in beam (JESSICA hall)
- x-y-adjustable holding frames and positioning rail from HIM + height adjustable pedestal



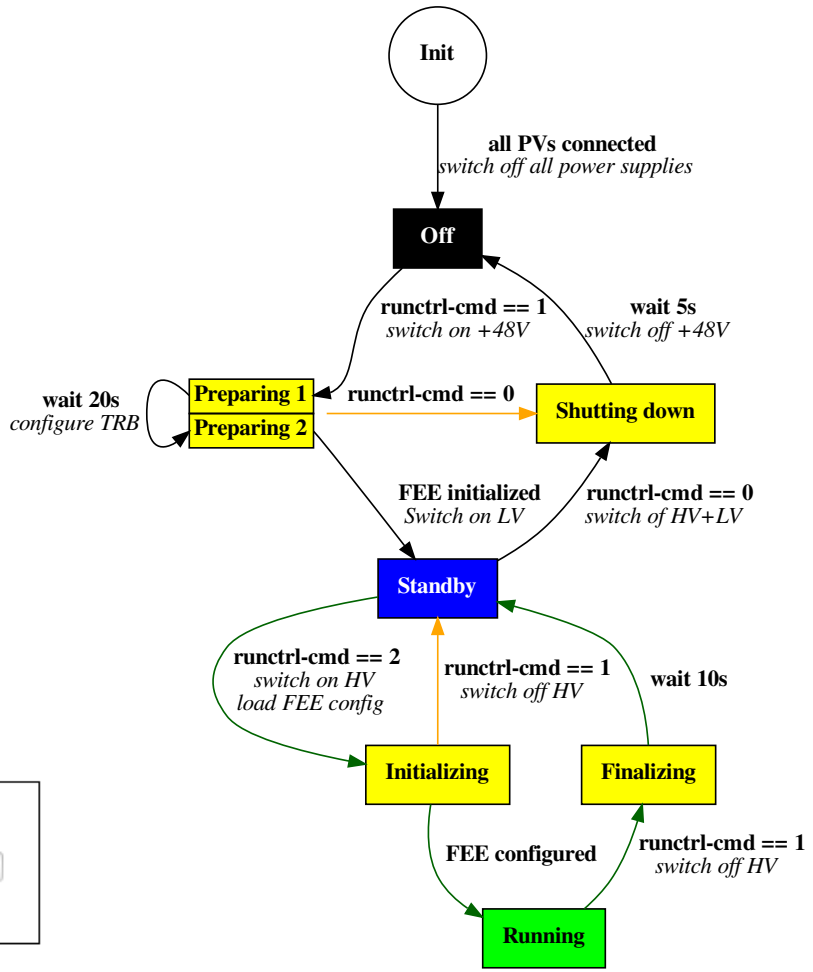
Beamtests with MuPix Telescope

Beamtests with MuPix Telescope

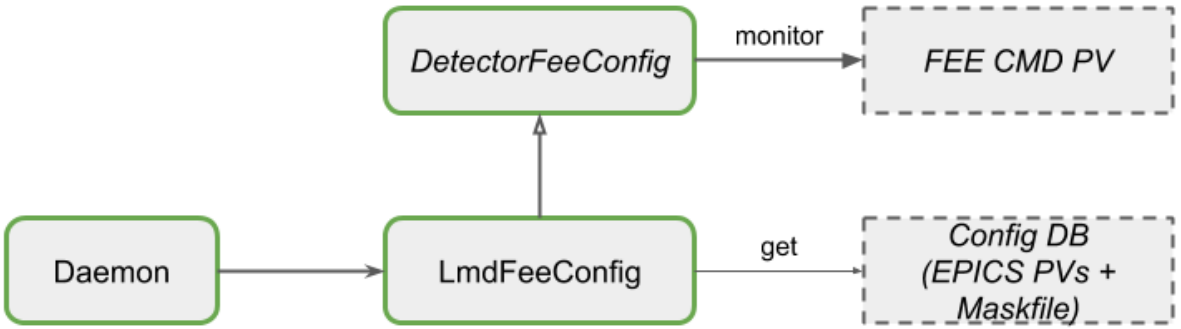
- Goals: Readout of all submatrices (A,B,C) of four chips, test new control software based on EPICS for LV/HV and sensor configuration
- Wrote prototype runctrl for test setup
- Wrote prototype DCS-FEE-Interface to configure TRB and MuPix

Run Control for Telescope Setup

- FSM: State Notation Language Sequence program
- EPICS Records holding information (State, CMD, ...)
- DAQ monitors current state of DCS (not tested!)
- Error Handling missing!



DCS-FEE-Interface for Telescope Setup



- DCS-FEE-Interface implemented in python3
- Abstract base class "*DetectorFeeConfig*"
  - Monitors "FEE Command" PV from EPICS (PVaccess)
  - Initializes TRBnet interface
- Implementation of Telescope config in derived class
  - Get configuration parameters (67 per MuPix, single PVaccess call)
  - Read Maskfile (file name from EPICS PV)
  - Generate 200 bitstreams
  - Send bitstream via trbnet to TRB/MuPix

Problems

- DAQ regulary reading values from TRBnet (“SERDES monitor”)
- TRBnet crashed when DAQ program and DCS-FEE-Interface running at same time
- Some error in calculation of threshold voltages

Summary

- First successfull test of RunCtrl and Finite State Machine
- DCS-FEE-Interface in principal works
- Currently python code, C++ might be better
- TrbNet too unstable (multiple clients lead to crashes)
- No implementation for configuration DB, yet