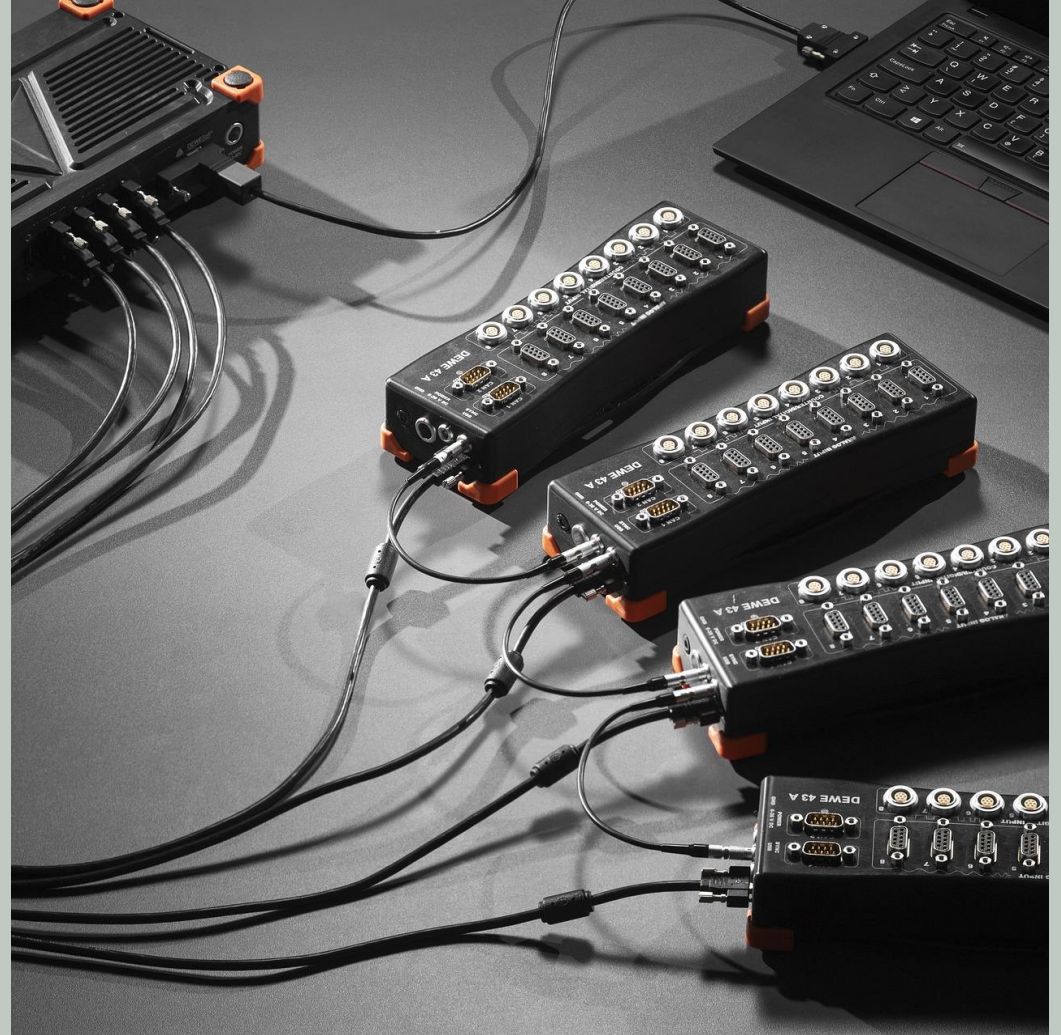


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# MIDAS in SuperCDMS

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September 13, 2023



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01 SuperCDMS

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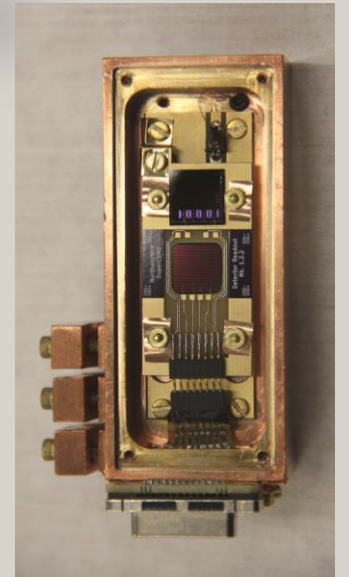
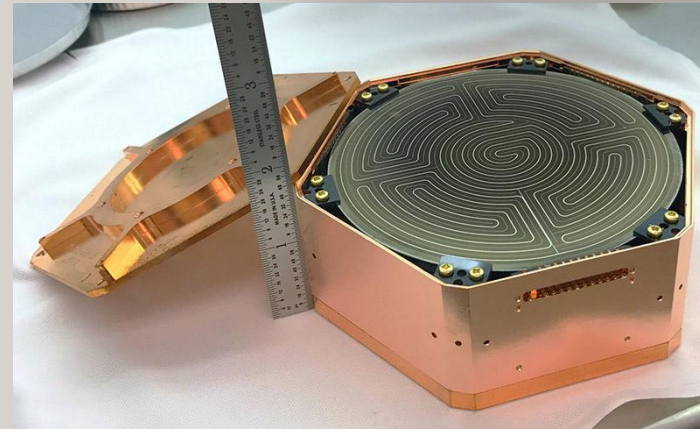
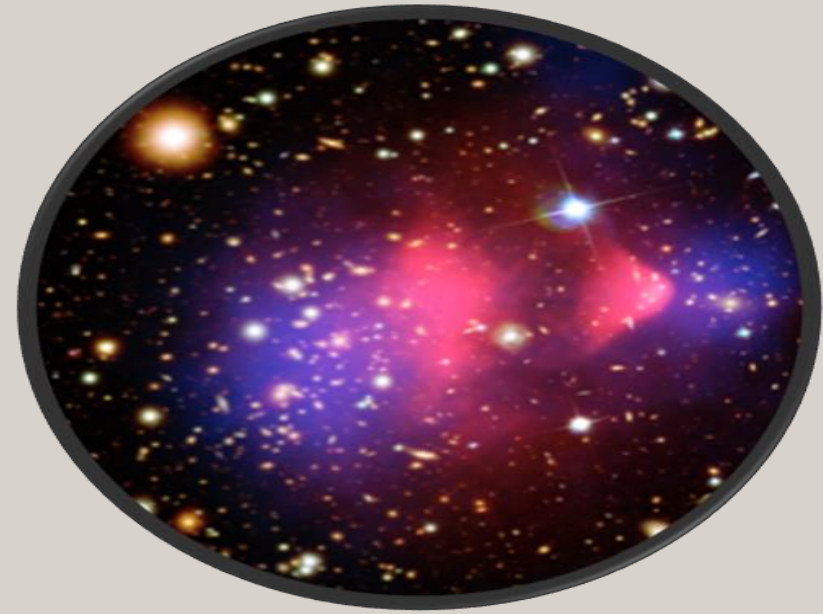
03 User experience

04 Moving forward

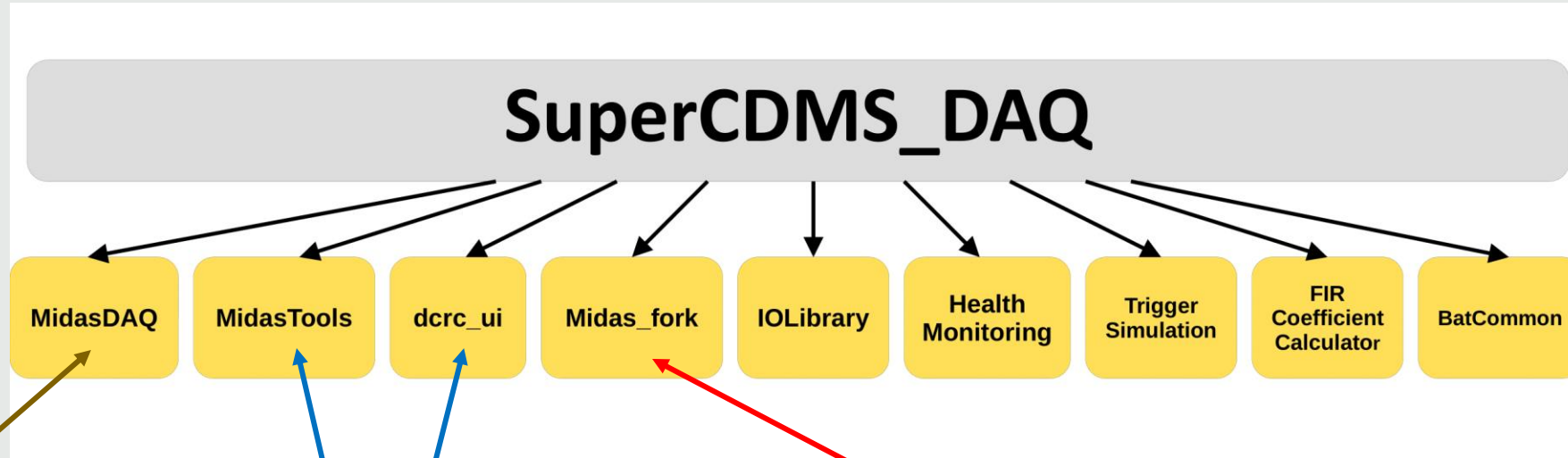
# 01 SuperCDMS

A medium sized dark matter search experiment/collaboration geared towards low mass WIMPs and sub-GeV dark matter.

- Main experiment based at SNOLAB – DAQ installed in winter 2021
- DAQ system is shared across several test facilities: various detector technology but (roughly) the same data acquisition system - MIDAS



# 02 MIDAS in SuperCDMS



SuperCDMS-owned private DAQ package

The open-source MIDAS

User interface and Data Visualization

# 02 MIDAS in SuperCDMS

## midas\_fork:

- Forked from the main MIDAS gitbucket repo originally.
- Minor differences developed for SuperCDMS specific needs
  - Modified some default settings (ODB dump format in XML)
  - Separate documentation
- Semi-regularity pulled from the MIDAS gitbucket repo (~ every year).
- Coincidentally, managed by MIDAS developer :-)

# 02 MIDAS in SuperCDMS

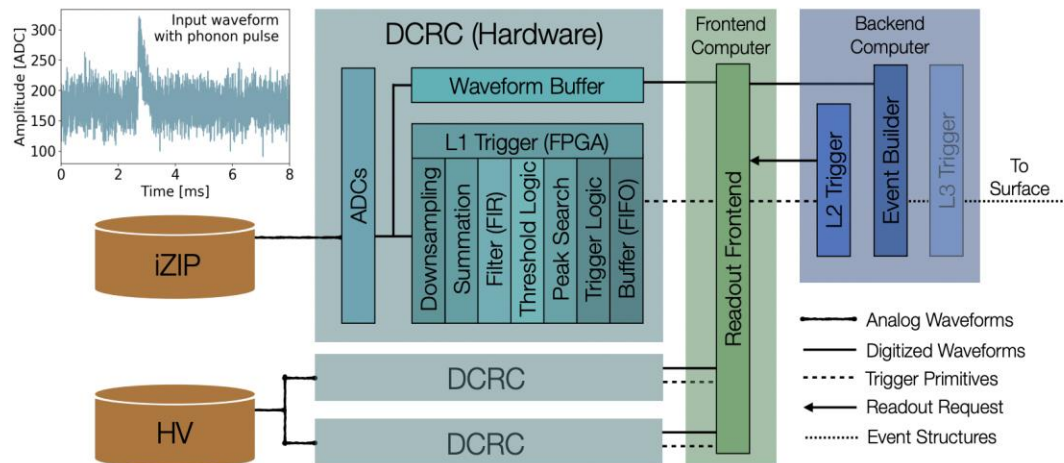
## MidasDAQ:

- Privately owned by SuperCDMS, developed jointly by MIDAS developers and SuperCDMS collaborators.
- Caters to the need of SuperCDMS and its test facilities
  - Interfaces with >30 detector readout cards (DCRCs), 24 detectors, and >300 channels
  - trigger system & continuous readout
  - Mysql database for slow control and data quality monitoring

# 02 MIDAS in SuperCDMS

## Baseline MIDAS frontends

- Each DCRC has a 'Driver' and 'Readout' frontend
- Other fe: L2Trigger, EventBuilder, HV, Baseline, Lock manager
- 3-level trigger system consisting TWO level real-time trigger
- FPGA based L1 triggering



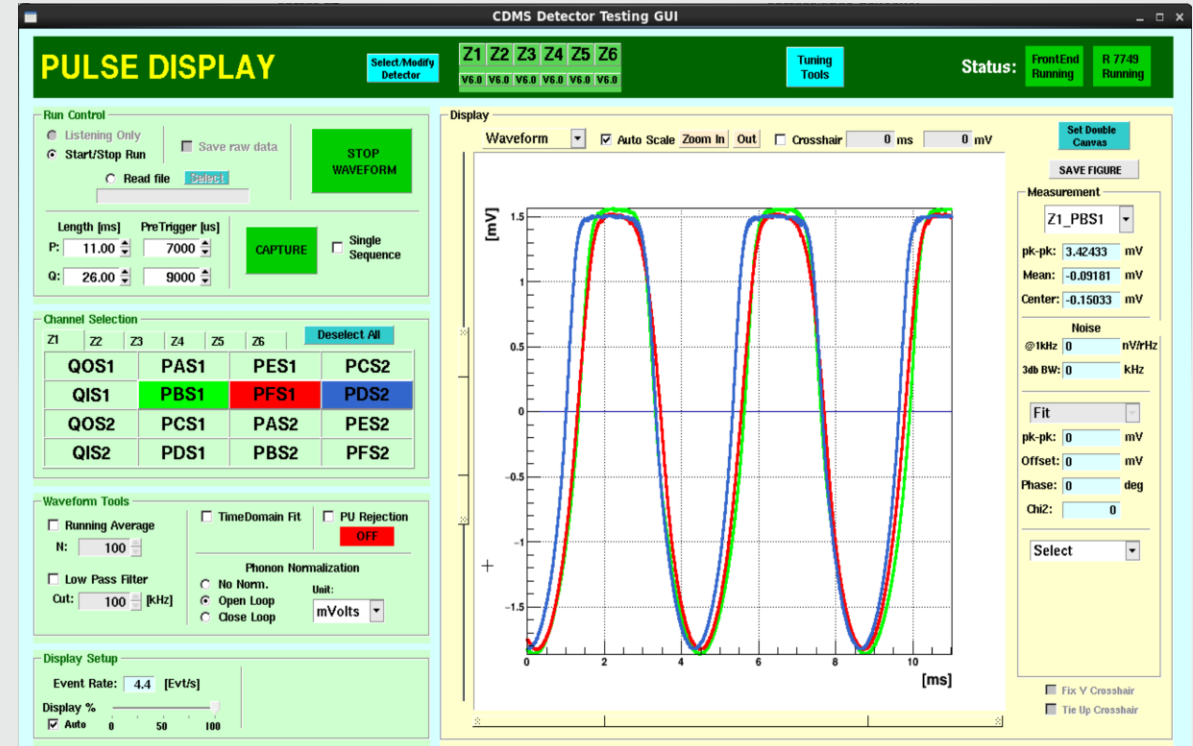
Programs				
Program	Running on host	Alarm class	Autorestart	Commands
mserver	localhost	-	No	Stop mserver
mhttpd	localhost	-	No	
Logger	localhost	-	No	Stop Logger
Sequencer	localhost	-	No	Stop Sequencer
Lazy_0	localhost	-	No	Stop Lazy_0
L2Trigger	Not running	-	No	Start L2Trigger
eventbuilder	Not running	-	No	Start eventbuilder
multipleVirtualDCRC	Not running	-	No	Start multipleVirtualDCRC
HVDriver	localhost	-	No	Stop HVDriver
TestDetector	Not running	-	No	Start TestDetector
DCRCDriverRevE01	Not running	-	No	Start DCRCDriverRevE01
readoutfe_01	Not running	-	No	Start readoutfe_01
DCRCDriverRevE02	Not running	-	No	Start DCRCDriverRevE02
DCRCDriverRevE03	Not running	-	No	Start DCRCDriverRevE03
DCRCDriverRevE04	Not running	-	No	Start DCRCDriverRevE04
readoutfe_02	Not running	-	No	Start readoutfe_02
readoutfe_03	Not running	-	No	Start readoutfe_03
readoutfe_04	Not running	-	No	Start readoutfe_04
pyruncontrol	Not running	-	No	Start pyruncontrol

## SuperCDMS MidasDAQ frontends

# 02 MIDAS in SuperCDMS

## MidasTools:

- Provides real-time data visualization
- Enables routine detector testing tasks (transition curve measurement)





# 02 MIDAS in SuperCDMS

dcrc\_ui:

- Provides a user-friendly interface
  - Intuitive, efficient (mass-editing ODB keys)
- Typical operation tasks during stable running

The screenshot displays the dcrc\_ui interface with a menu bar (Log, Run Control, Detector, L1 Trigger, LED Flash, ZAP, Detector Testing, General, ODB, Help) and a status bar (Sequencer is off, Run stopped, Not Write to data, Update ← gray Sequencer/Run boxes AND Detector, Trigger, & Detector Testing data every 8 sec, Power Over Ethernet: POE1, POE2, and specs).

**DAQ Alarms and Transition Information**

No alarms  
No transition errors  
Last update 08/30/2023 23:27:15  
Update progress

**DAQ status:**

Total events  
Total rate  
Total time 00:00:00

**Run start/stop**

Start Stop  
Start 08/12/2023 17:23:28  
Stop 08/12/2023 18:06:49

**Run type**

Ba Run  
Manual Calibration Run  
No-Source Run  
Test Run  
ZAP  
LED Flash  
User-Specified Script  
User-Generated Sequence

**Run config (ZAP)**

Select ZAP  
(268) CUTE ZAP settings Det3 [View]  
Not blessed  
Detector: Det1  
ZAP repetitions (#)  
ZAP ON/OFF time

**ZAP alert**

ODB Det matching with selected ZAP parameters: 1 2 3  
ODB Det not matching with Selected ZAP parameters: 5 6 7  
Click 'View' to see and compare detectors numbers in ZAP parameters and ODB.  
OK

# 03 User Experience

- MIDAS-based DAQ system is widely used within the SuperCDMS collaboration
  - > 8 DAQ instances running across different institutions
- Generally speaking, very robust and versatile
- Several use cases for the midas python tools, expect more in the future

# 03 User Experience

- Installation procedure relatively straight-forward to people with some software experience
- Share community concerns about future OS problem
- Sequencer
  - Backbone for any high-level detector operation
  - requires very strict syntax
  - We wrote a python script to write tedious sequenser scripts

# 04 Future features

- GUI/buttons for ODB mass-editing
  - Make it less tedious for doing the same tasks on different detectors/readout boards
- Emails to people talking about new features/bug fixes when MIDAS is updated?
- Develop a user interface?
- Organize MIDAS workshop for beginners?

Thank you!