EIGER integration in MXCuBE

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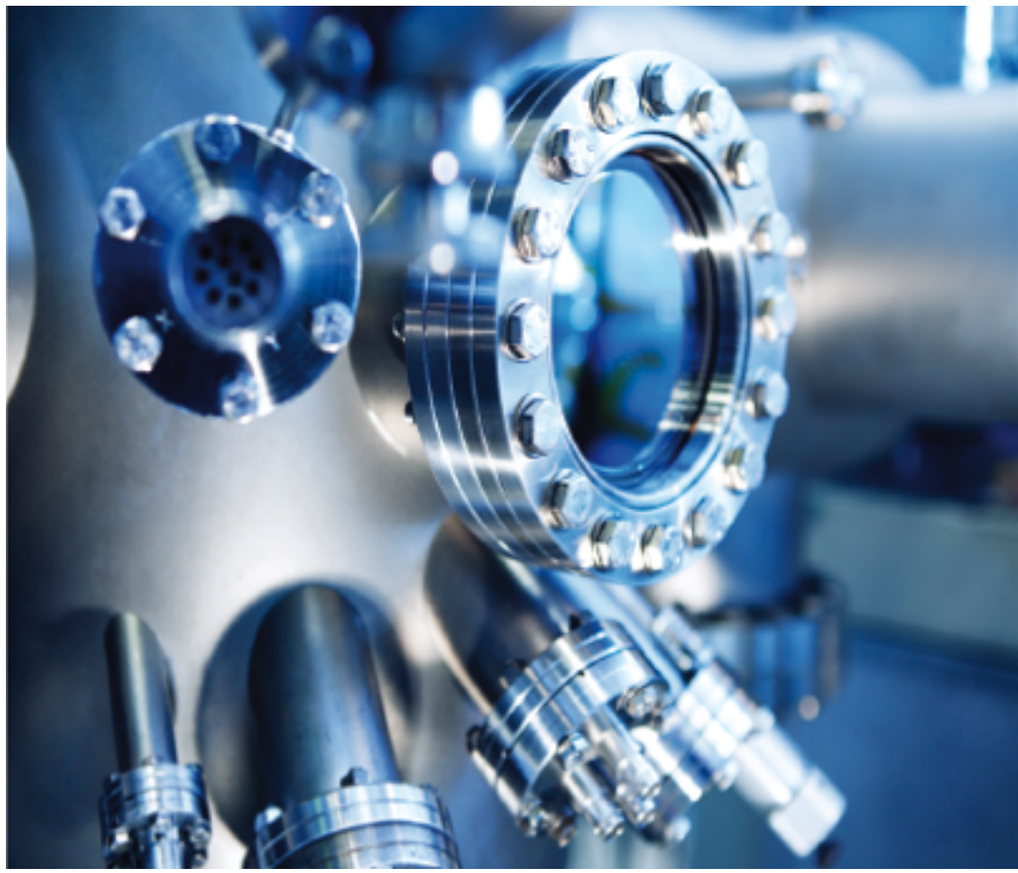
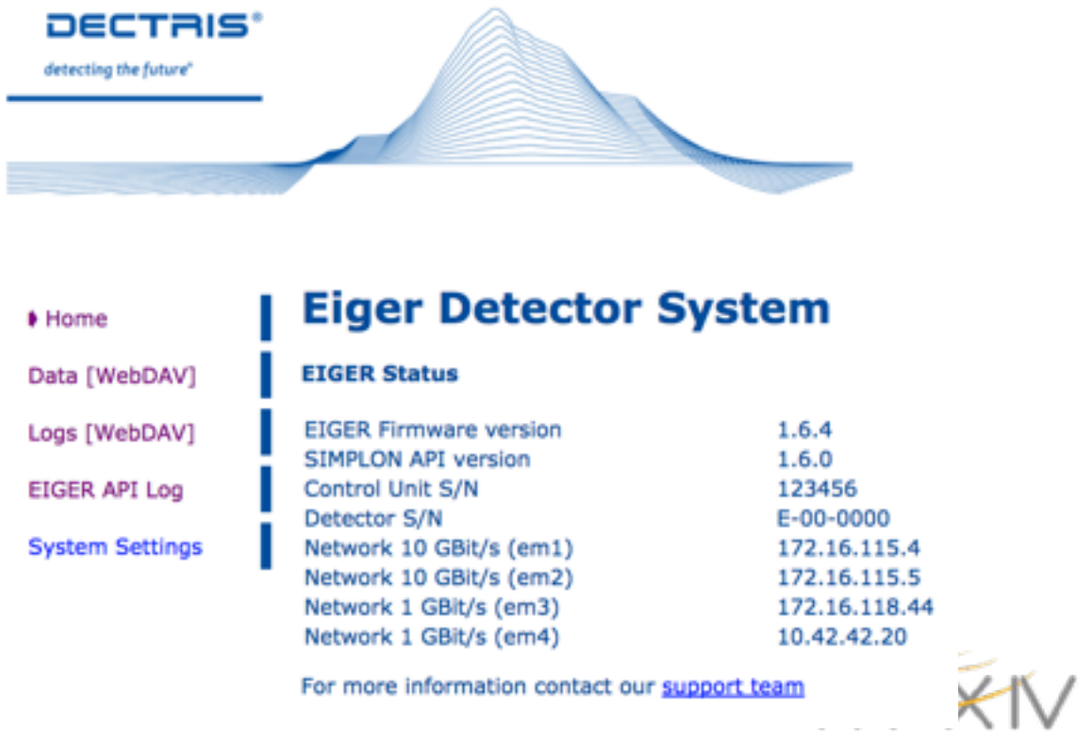
Outline

- Eiger communication recap
- EIGER Tango device and MAXIV additions
- Additional remarks



Eiger Control interface

- EIGER Firmware version 1.6.4
- SIMPLON API version 1.6.0
- Web interface for simple operations and testing
  - initialize, upgrade, testing, network, logging
- REST API
  - complex configuration
  - experiment control
- zeromq streaming



Simplon API

- HTTP GET, PUT operations
- Resources are identified as (e.g.):

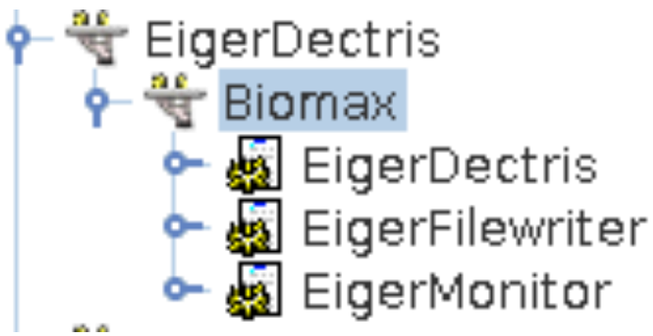
  “http://<IP_of_DCU>/<module>/api/<api version>/task/<parameter>”

  - where:
    - module: detector, monitor, file writer, stream, system
    - task: config, status, command
    - each module has different parameters
- GET at http://172.16.118.44/detector/api/1.6.0/config/photon_energy
- Documented API


```
{
  "min": "5000.0",
  "max": "36000.0",
  "value": "12660.0",
  "value_type": "float",
  "access_mode": "rw",
  "unit": "eV"
}
```

Eiger tango device

- Independent of MXCuBE: very useful for testing
- Thanks to T. Nuñez (DESY)
- Multiclass device: a tango device per ~module
- python
  - *request* library for HTTP GET PUT
  - easy to add attributes




```
response = requests.get(url, timeout=timeout)
data = json.loads(response.text)
return data["value"]
```

http://svn.code.sf.net/p/tango-ds/code/DeviceClasses/Acquisition/2D/EigerDectris/

https://github.com/MaxIV-KitsControls/dev-maxiv-eigerdectris

Eiger tango device

- MAXIV additions:
  - Some new attributes
  - fixes for latest simplon api bugs and operation
- *Might* not work properly with versions < 1.6

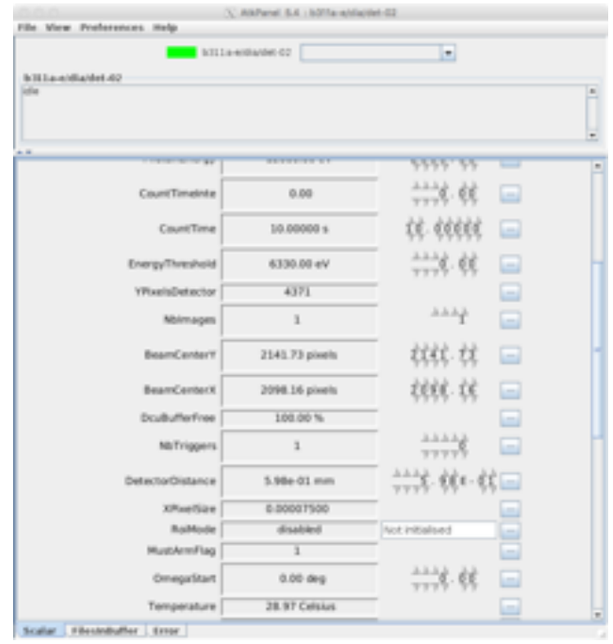
- spawn/stop dcu data backup procedure
- cleanup and status/state management
- check for path collision before arm/trigger
- increasing timeout
- status update after cancel/abort
- increased timeout in some attr
- update x,y pixel size when roi changes
- Implement DcuBufferFree attribute
- Remove mask attributes
- Fix status_update and wait commands
- Prepare trigger detection in Arm command
- Add wait_for_trigger command in the detector
- Send status_update before requesting temperature/humidity
- Send status_update command before requesting state
- pixel size x,y; pixels in detector x,y
- do no reset flag_arm right after arming (ready status)
- roi mode argument values, 4M and disabled
- When reading Frametime update min/max values as well
- removing pixel mask, big array causing problems
- Roi mode attribute, check supported values!
- added compression attribute, supported values: lz4, bslz4
- Pixel mask stuff
- Omega stuff
- detector distance attribute
- added beam center x,y configuration attributes

Eiger tango device

EigerDectris class

- Attributes:

'NbTriggersMin', 'Temperature', 'Time', 'FrameTime', 'NbTriggersMax', 'YPixelSize', 'Compression', 'OmegaIncrement', 'DownloadDirectory', 'TriggerMode', 'XPixelsDetector', 'NbImagesMax', 'PhotonEnergy', 'Wavelength', 'CountTimeInte', 'CountTime', 'AutoSummationEnabled', 'EnergyThreshold', 'NbImagesMin', 'YPixelsDetector', 'EnergyThresholdMax', 'NbImages', 'CountTimeMax', 'BitDepth', 'Description', 'EnergyThresholdMin', 'FilesInBuffer', 'BeamCenterY', 'BeamCenterX', 'CountTimeMin', 'DcuBufferFree', 'NbTriggers', 'Humidity', 'ReadoutTime', 'FrameTimeMax', 'Error', 'PhotonEnergyMin', 'DetectorDistance', 'FrameTimeMin', 'FlatfieldEnabled', 'XPixelSize', 'RoiMode', 'MustArmFlag', 'RateCorrectionEnabled', 'PhotonEnergyMax', 'OmegaStart', 'State', 'Status'



- Commands:

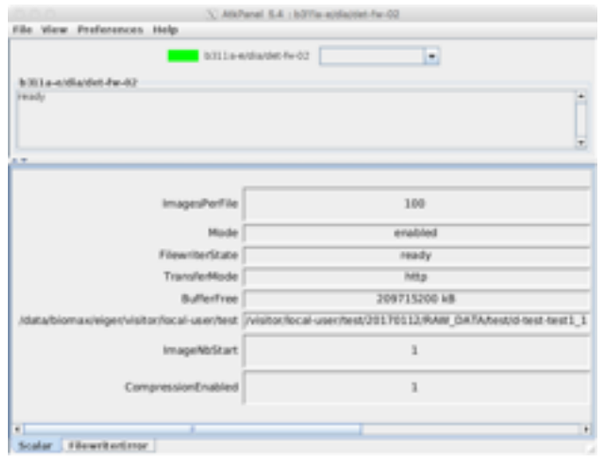
'Abort', 'Arm', 'Cancel', 'ClearBuffer', 'DeleteFileFromBuffer', 'Disarm', 'DownloadFilesFromBuffer', 'Init', 'State', 'Status', 'Trigger'

Eiger tango device

EigerFilewriter class

- Attributes:

'FilewriterError', 'ImagesPerFile', 'Mode', 'FilewriterState', 'TransferMode', 'BufferFree', 'FilenamePattern', 'ImageNbStart', 'CompressionEnabled', 'State', 'Status'



- Commands:

'Clear', 'Init', 'InitializeFilewriter', 'State', 'Status'

Some remarks (v1.6)

- A few undocumented keys in the API
- Parameters that might affect additional parameters
  - answer includes related parameter that have changed
- Long timeouts when arming (< 10 s)
- "Wait" command:
  - No status change when exts/exte, always in ready (in ints you switch between ready/acquire)
  - To see the status updates, send the wait command after the arm
    - Command does not appear in the api doc!
- After arm config parameters do not have effect, arm will apply whatever has been fixed
- Before requesting detector state: send "status_update"
  - this is an internal workaround to be fixed in the next releases
- Detector status and detector head state not synchronized properly

Eiger hwobj

- In HardwareObjects.MAXIV.BiomaxEiger.py
  - *prepare_acquisition:*
    OmegaStart, OmegaIncrement, BeamCenterX, BeamCenterY, start, osc_range, exptime, ntrigger, number_of_images, images_per_file, compression, ROI, wavelength, FilenamePattern
    - *start_acquisition:*
      - arm detector and wait for the trigger
- In HardwareObjects.MAXIV.BiomaxCollect.py (from AbstracCollect)
- See Jie's recent PR to mxcube HardwareObjects

```
class BIOMAXEiger(Equipment):
    """
    Description: Eiger hwobj based on tango
    """
```

```
<equipment class ="MAXIV.BIOMAXEiger">
  <type>EIGER</type>
  <model>16M</model>
  <manufacturer>DECTRIS</manufacturer>
  <file_suffix>h5</file_suffix>
  <default_exposure_time>0.05</default_exposure_time>
  <default_compression>bslz4</default_compression>
  <buffer_limit>50000</buffer_limit>
  <detector_device>b311a-e/dia/det-02</detector_device>
  <filewriter_device>b311a-e/dia/det-fw-02</filewriter_device>
  <width>4150</width>
  <height>4371</height>
  <min_trigger_energy_change>10</min_trigger_energy_change>
  <beam>
    <ax>-0.00251407429778</ax>
    <ay>0.00426788308523</ay>
    <bx>2099.66249149</bx>
    <by>2139.18150251</by>
  </beam>
</equipment>
```

Thanks for your attention!