

Experience with Eiger 9M at Proxima 2A, SOLEIL

Martin Savko

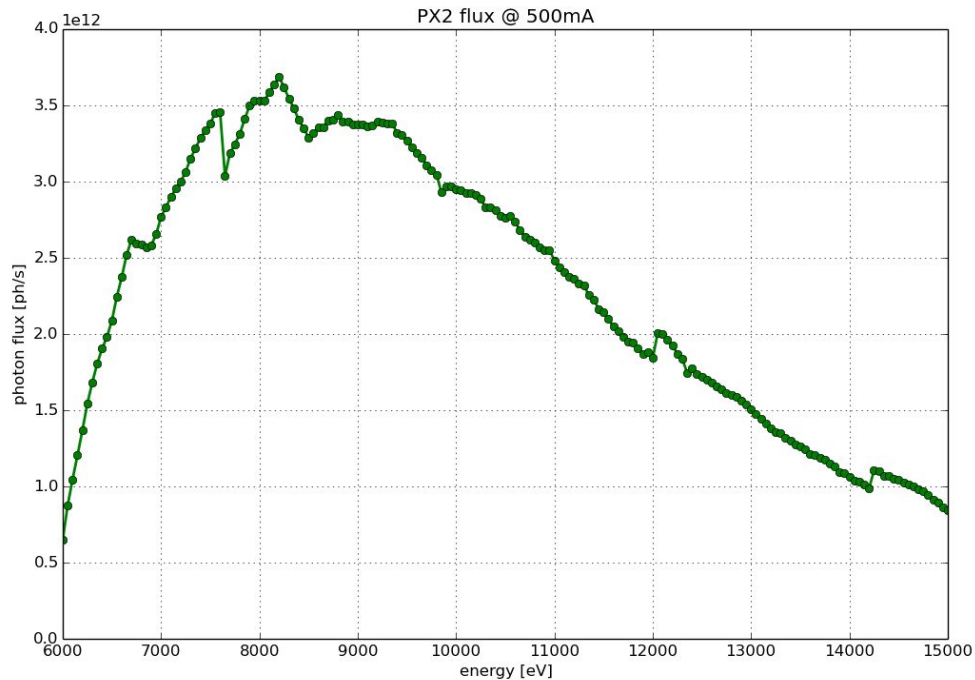
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Overview

- Beamline
- Eiger commissioning
- Performance of the setup
- Upgrade

Proxima 2A

- Users since March 2013
- Microfocus (5x10um)
- 3.6e12 ph/s @ 8.1keV
 - Tunable 5 - 18 keV
- MD2 goniometer
- CATS sample changer
- Eiger 9M detector (we started with ADSC q315)
- MXCuBE user interface (on top of TANGO)



Eiger delivery -- what's in the box

- Eiger detector
- 4 cat6A cables of 20 m
- Server
 - 4 x 10Gbit dedicated lines to detector
 - 4 ports to communicate with outside world
 - 2 x SFP+ ports
 - 2 x 1Gbit ports

Installation and commissioning

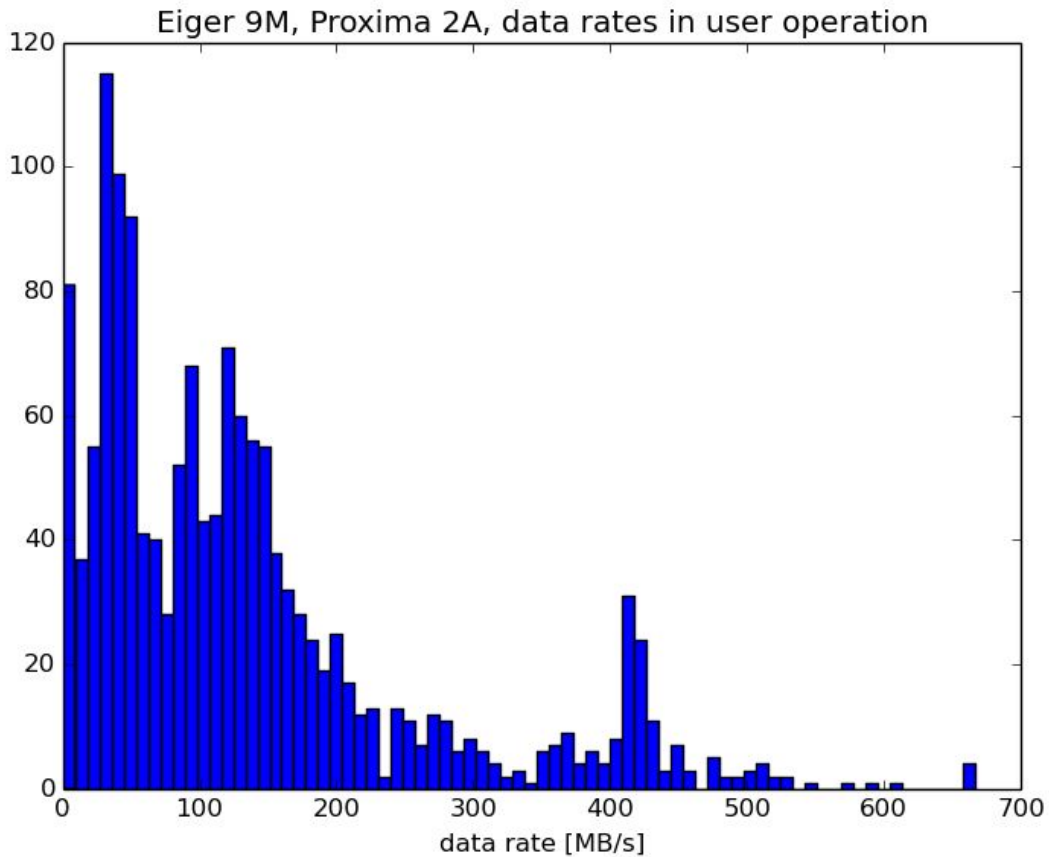
- Installation 16th November
- Cabling and connection to the beamline network
- Site acceptance tests 18th -19th November
 - Smooth -- collecting MX data at full speed the second day
 - Scripts we used can be consulted at <https://github.com/MartinSavko/eiger>
- User operation via MXCuBE since December 2015
- bslz4 compression
- Max speeds
 - 238Hz @ 9M
 - 750Hz @ 4M ROI (stable as of SIMPLON API 1.6.2)

Supporting infrastructure

- 10Gbit network
- Storage (Active Circle based), NFS access
 - Tiered system
 - 10TB local SSD
 - 20TB local SAS
 - 1PB remote
- Processing
 - 3 x DELL Precision T5600, Linux 64 bit
 - XEON 2650 v2 @ 2.7GHz, 2 sockets, 8 cores per socket, 32 threads
 - 3GB RAM / thread (96 GB per machine)

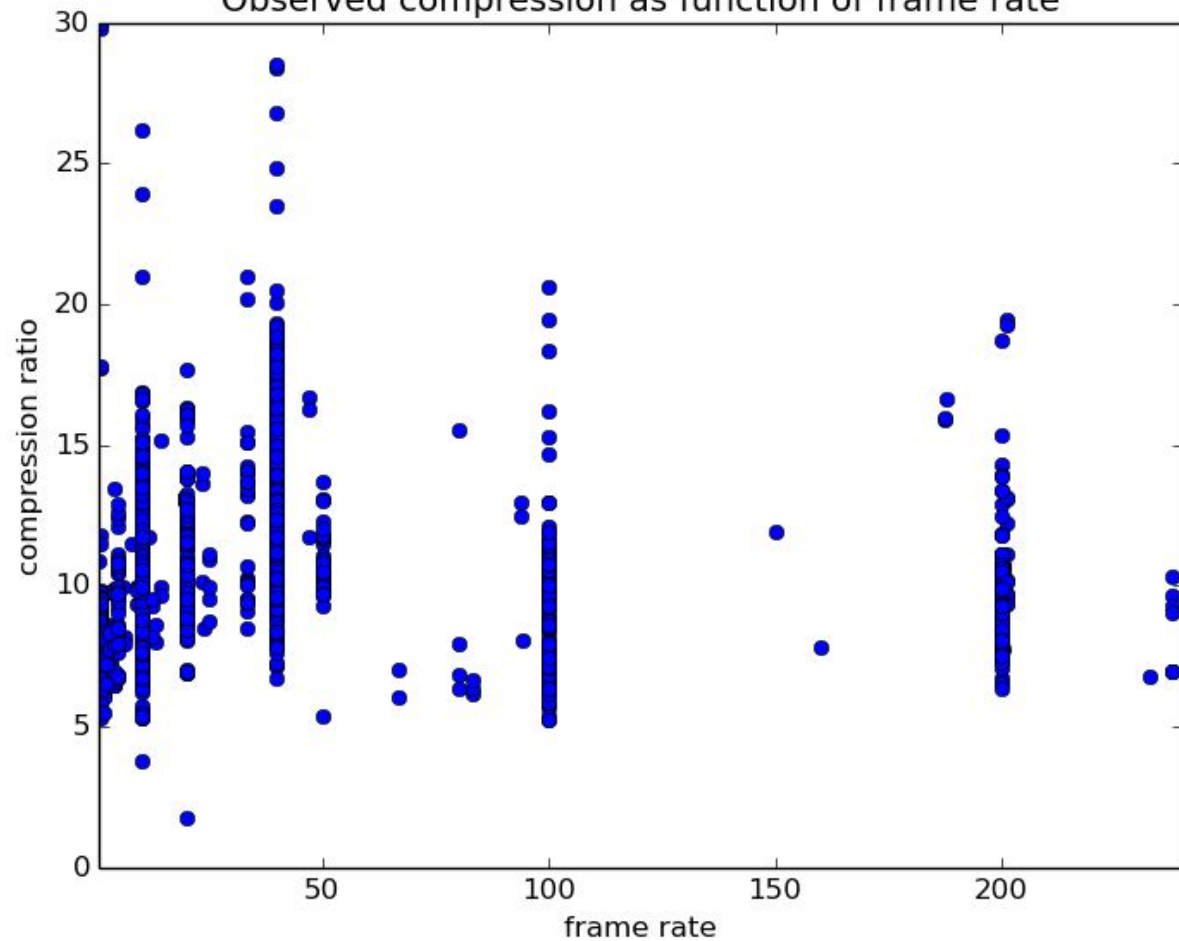
Performance of the setup

- ~600 MB/sec download speed
 - Single 10Gbit port currently used for getting data out of DCU
- 170 MB/s is average data rate
 - Maximum observed data rate 670MB/s
 - No data transfer bottleneck thanks to bitshuffle lz4
- The server has RAM cache of 170 GB
 - ~15 min autonomy assuming average data rate in bslz4 compression
- 7.71 is average observed bslz4 compression ratio
 - x 7.64 per 32bit -- average compressed image size 4.91MB
 - x 16.75 per 16bit -- average compressed image size 1.12MB



The highest data rates observed above 200 frames per second

Observed compression as function of frame rate



Eiger Data Processing

- Processing via XDS
 - xdsme, autoPROC
 - Recent XDS for efficient data caching
 - Useful tips at <http://strucbio.biologie.uni-konstanz.de/xdswiki/index.php/Eiger>
- Processing HDF5 data compared to CBF equivalent with XDS is slower
 - at least 20% overall penalty
 - more often we see penalty closer to 50% or more
 - beware of what is running on the computer at the same time (avoid virtualbox :) !
- Conversion from HDF5 to CBF
 - 28Hz on our best machines (32 threads @ 2.7GHz)
 - H5ToXDS run in parallel via python wrapper to generate correct mini-cbf header
 - Generation of temporary CBFs makes sense if data need to be accessed repeatedly
- **Processing power needs to be boosted to keep up !**

Upgrading the processing infrastructure

- Huawei FusionServer RH8100 V3 Rack Server *

- 8 x XEON E7-8890 v3 @ 2.5GHz
- 144 cores, 288 threads
- 2.56 TB RAM (DDR4 1866MHz)
- 4 x 10GBe
- 5.76 TFlops (estimated)
- 8U form factor

- System dedicated to the single beamline

- large memory -- data for on-line processing will be kept in ramdisk
- automatic generation of temporary CBFs for faster analysis
- estimated spot finding speed >100Hz



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