KAGRA
Detector Characterization

Kazuhiro Hayama
On behalf of KAGRA Detector Characterization

Human Resource

- Chief : Hayama

- Akutsu, Kaneyama, Kokeyama, Miyakawa, Miyamoto, Ono, Shoda, Ueno,Yamamoto, Yokozawa, Yuzurihara

- KGWG detchar group （4）

  FTE : ~ 0.9

Interface

Data Analysis

Veto info., target veto , Data quality, calibration accu.
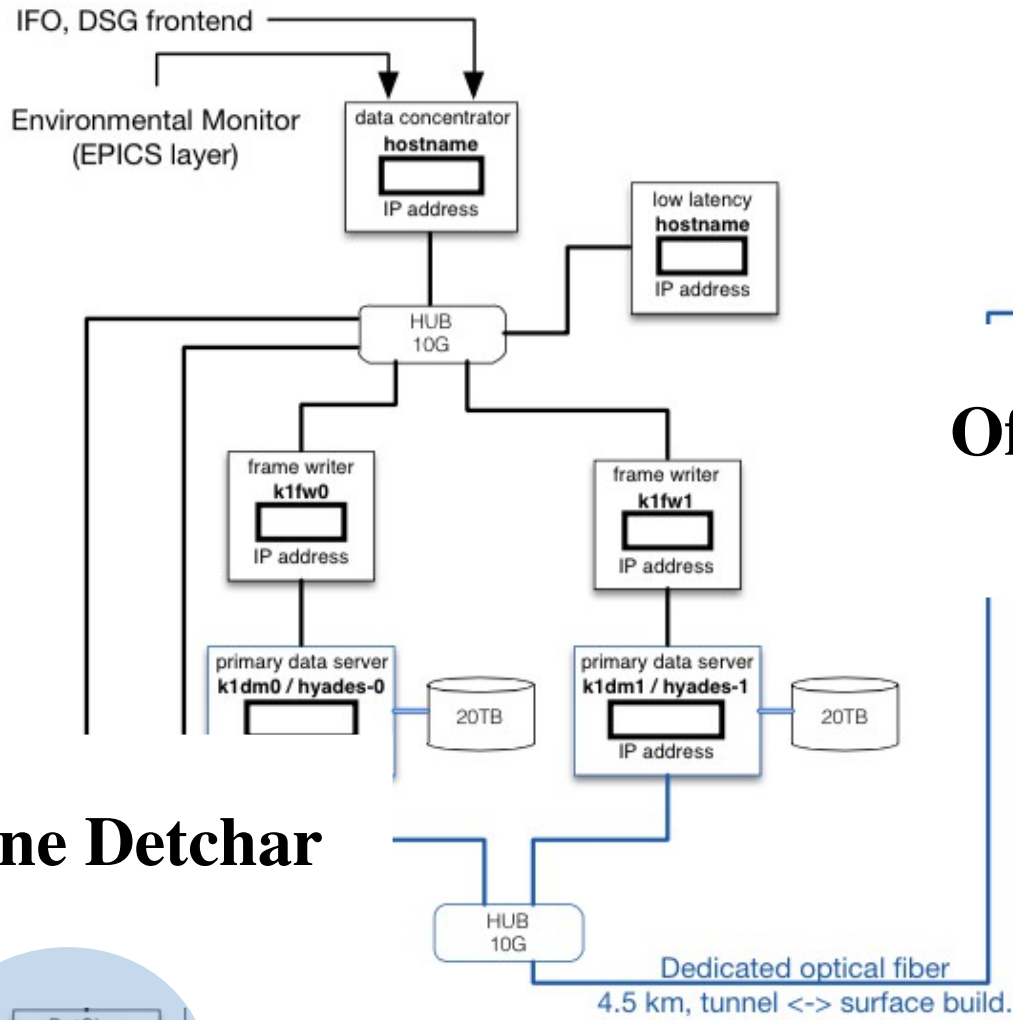
Detector Characterization

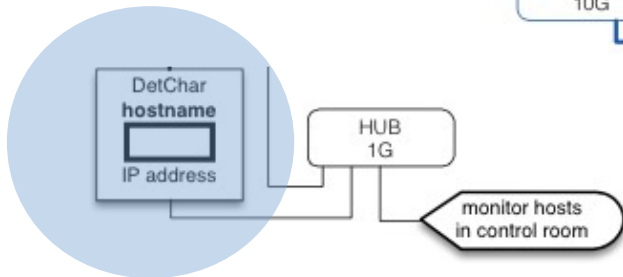PEM, Aux. channels, Online-monitors, diagnostics

Instruments

Tasks

- Commissioning phase

  - **To provide diagnostics tools**

    - **To monitor whether data is normal or not**

    - **To find correlations between PEM channels.**

    - **To find non-stationary noise events, oscillations**

    - **…**

  - **Support to localize noise sources which prevent KAGRA from reaching the design sensitivity.**

  - **To supply data quality**

  - **With cooperation with subsystems, what kinds of EM, channels are needed.**

- Observation phase

  - **To provide data quality flags to the GW search group**

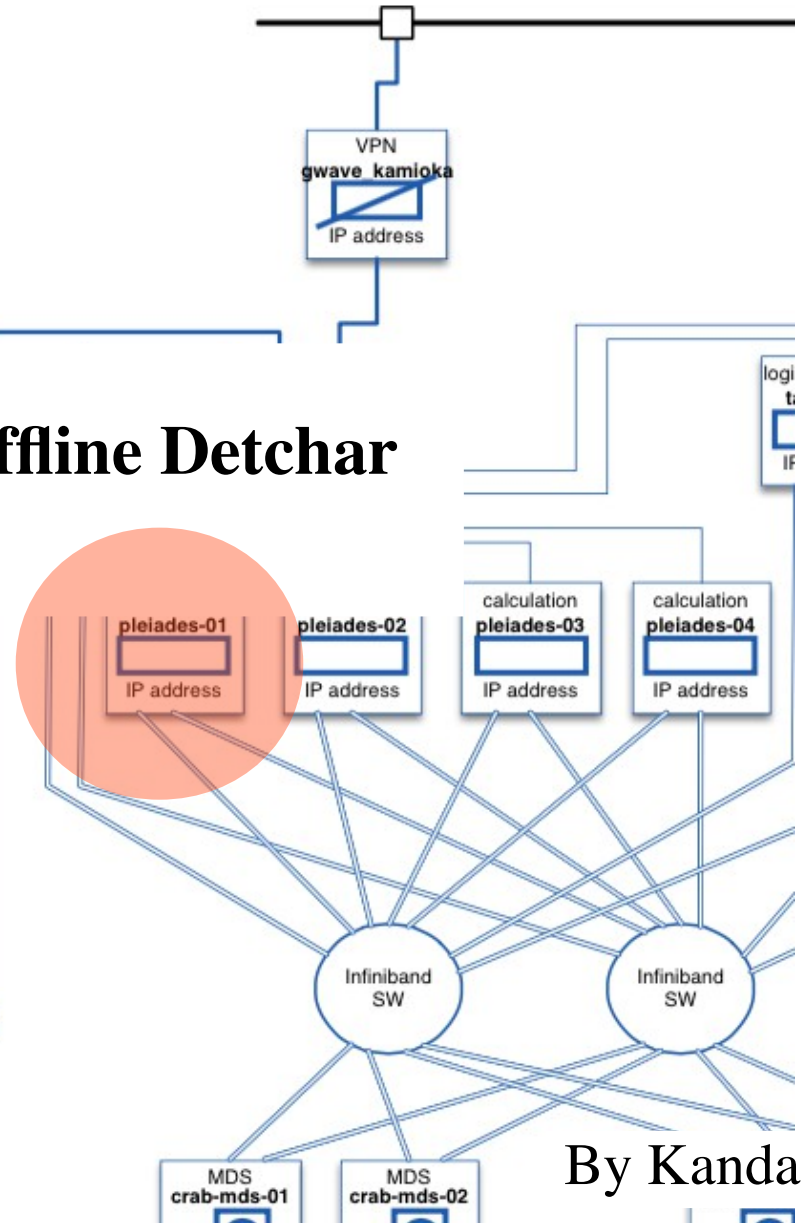 - **To perform veto analysis using the data quality and multi-variate analysis**

Network

IFO, DSG frontend

Environmental Monitor (EPICS layer)

data concentrator
hostname
IP address

low latency
hostname
IP address

HUB
10G

frame writer
k1fw0
IP address

frame writer
k1fw1
IP address

primary data server
k1dm0 / hyades-0
IP address

20TB

primary data server
k1dm1 / hyades-1
IP address

20TB

Online Detchar

DetChar
hostname
IP address

HUB
1G

monitor hosts
in control room

HUB
10G

Dedicated optical fiber
4.5 km, tunnel <-> surface build.

VPN
gwave_kamioka
IP address

Offline Detchar

logi
t
IP

pleiades-01
IP address

pleiades-02
IP address

calculation
pleiades-03
IP address

calculation
pleiades-04
IP address

Infiniband
SW

Infiniband
SW

MDS
crab-mds-01

MDS
crab-mds-02

By Kanda

DetChar Projects

Primary Projects

- 🟢 To maintain Diagnostics Test Tool
- 🟢 Detchar GUI
- 🟢 Glitch Monitor
- 🟢 Detchar web page
- 🟡 Line Monitor
- 🟢 correlation finder
- 🟢 Noise Modeling
- 🟢 Rayleigh Monitor
- 🟢 Noise Floor Monitoring
- 🟢 Range Monitor
  (Inspiral, Ringdown,
  Insp-Merger-Ringdown,
  Stochastic)
- 🟡 Noise Budget
- ⬜ Health Monitor
- 🟢 Data base
- ⬜ Quality flag

Special Projects

- 🟢 Globally correlated mag noise
- 🟢 Violin mode
- 🟢 Multi-Channel Analysis
  (with Korea detchar, Mano)
- 🟡 Detchar shift plan
- 🟡 Newtonian Noise
  - 🟢 in progress
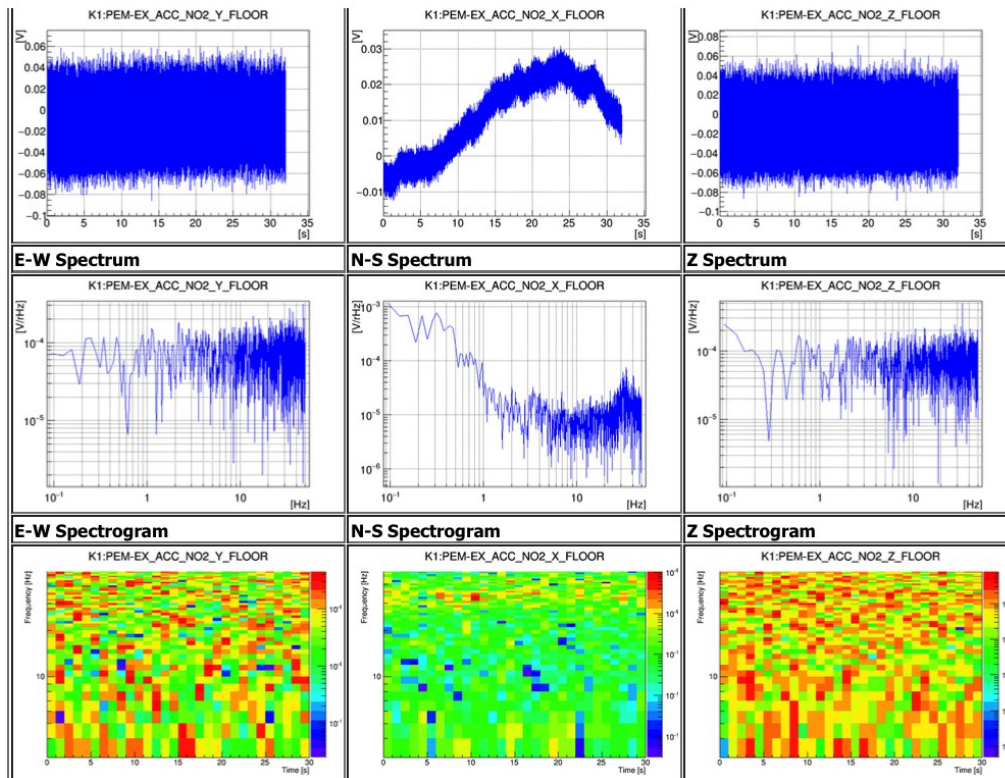 - 🟡 in slowly progress

Noise Characterization at the KAGRA site

https://github.com/gw-analysis/detector-characterization

Start Monitoring
Environmental Activities @ X-end

With CRY, NAOJ, ICRR@Kamioka

DAQ system

Quick Look Webpage

Most of things can be done through Web
Open Web site, Ready!

Please access the following web and try it.

Yamamoto, Hayama,
advice from Shoda from
experimentalist point of view
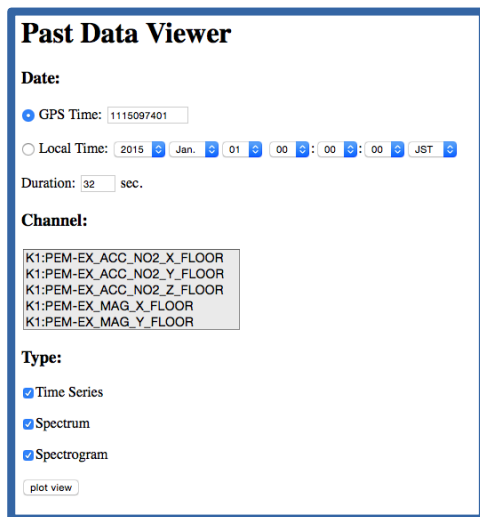
User name : guest

Password : toyamakamioka

Data Viewer

http://seikai.hep.osaka-cu.ac.jp/~chino/cgi-bin/pastDataViewer.cgi

Multi-Channel Analysis (Bruco)

http://seikai.hep.osaka-cu.ac.jp/~chino/cgi-bin/multiChannelViewer2.cgi

Correlation Analysis (Coherence, Peason)

http://seikai.hep.osaka-cu.ac.jp/~chino/cgi-bin/multiChannelViewer.cgi

Monitoring KAGRA Everywhere
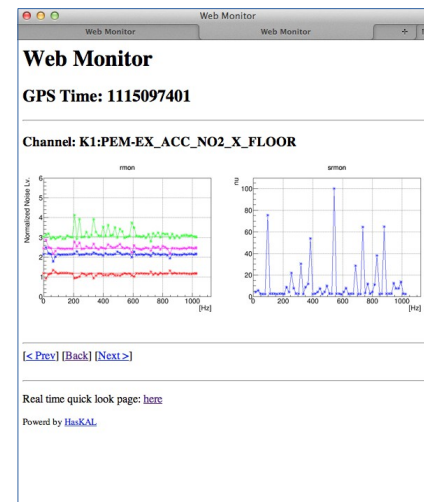
Schedule

- **The version of base compilers is frozen in Aug.**

- **Base software starts to be installed in the main machines from July.**

- **Test of the detchar system in the main machines starts from Aug.**

- **Recruit people**

During iKAGRA

- **Test of analyzed data flow**

- **Test of 50 channel monitoring**

- **Test of stable operation**

- **Noise hunting**

- **What kind of channels should be monitored for diagnostics and veto analysis**

bKAGRA

- **Integrating the experience into the systems.**

- **...**
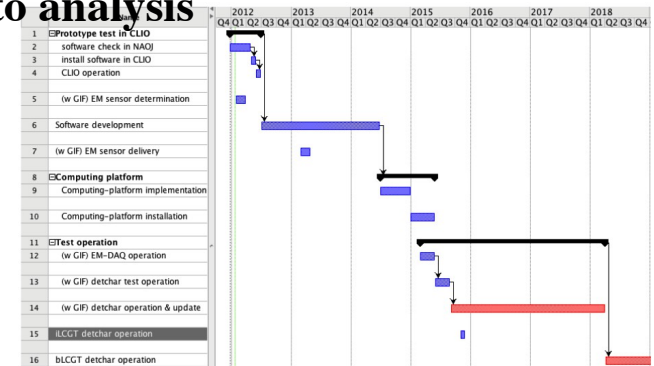
Issue : Human resource

- Currently, very limited human resource

- The web based tools help this issue.

- Hope one of each subsystem learn how to use detchar tools as early as possible