

Detector Characterization

Kazuhiro Hayama

On behalf of DET subsystem

Tasks

- **Environmental monitor sensors with GIF**
- **Environment and Instrument monitor**
- **Development of characterization system**

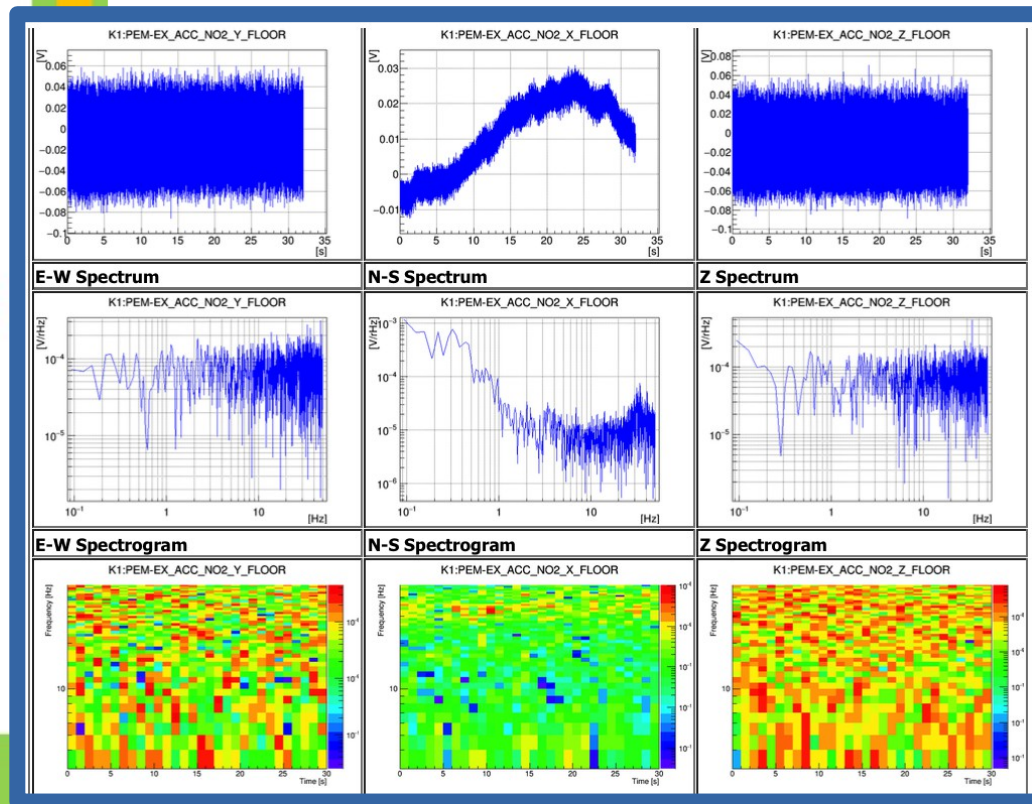
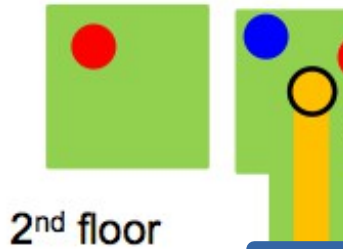
Preparing Environmental Sensors

With GIF

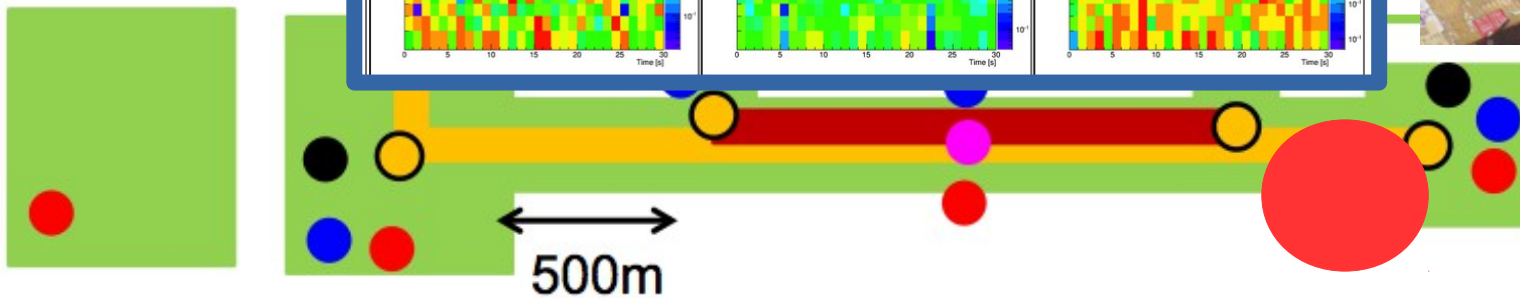
- **Hygrometer, thermometer, barometer are tested at the center area of KAGRA now.**
- **Seismometers, accelerometers are waiting for installation. (Feb ~ earlyMarch)**
- **Magnetometers will be introduced in the middle of this March.**
- **Slow data acquisition system will be set up ~early this March.**

Real-time environment monitor

Env Monitor at the X-End



2nd floor



Preparation of monitoring system

[General](#) | [VIS](#) | [IOO](#) | [Bruc](#) | [Web Tools](#)

Daily Summary Page

IOO

Calendar

Feb. 2016
 Mon. Tue. Wed. Thu. Fri. Sat. Sun.
 1 2 3 4 5 6 7
 8 9 10 11 12 13 14
 15 16 17 18 19 20 21
 22 23 24 25 26 27 28

Jan. 2016
 Mon. Tue. Wed. Thu. Fri. Sat. Sun.
 1 2 3
 4 5 6 7 8 9 10
 11 12 13 14 15 16 17
 18 19 20 21 22 23 24
 25 26 27 28 29 30 31

Dec. 2015
 Mon. Tue. Wed. Thu. Fri. Sat. Sun.
 1 2 3 4 5 6
 7 8 9 10 11 12 13
 14 15 16 17 18 19 20
 21 22 23 24 25 26 27
 28 29 30 31

Nov. 2015
 Mon. Tue. Wed. Thu. Fri. Sat. Sun.
 1
 2 3 4 5 6 7 8
 9 10 11 12 13 14 15
 16 17 18 19 20 21 22
 23 24 25 26 27 28 29
 30

Oct. 2015
 Mon. Tue. Wed. Thu. Fri. Sat. Sun.
 1 2 3 4
 5 6 7 8 9 10 11
 12 13 14 15 16 17 18
 19 20 21 22 23 24 25
 26 27 28 29 30 31

Sep. 2015
 Mon. Tue. Wed. Thu. Fri. Sat. Sun.
 1 2 3 4 5 6
 7 8 9 10 11 12 13
 14 15 16 17 18 19 20
 21 22 23 24 25 26 27
 28 29 30

Aug. 2015
 Mon. Tue. Wed. Thu. Fri. Sat. Sun.
 1 2
 3 4 5 6 7 8 9
 10 11 12 13 14 15 16
 17 18 19 20 21 22 23
 24 25 26 27 28 29 30
 31

Jul. 2015
 Mon. Tue. Wed. Thu. Fri. Sat. Sun.
 1 2 3 4 5

K1:PSL-PMC_TRANS_DC_OUT_DQ		
K1:PSL-PMC_TRANS_DC_OUT_DQ:TimeSeries 	K1:PSL-PMC_TRANS_DC_OUT_DQ:Spectrum 	K1:PSL-PMC_TRANS_DC_OUT_DQ:Spectrogram
K1:PSL-PMC_TRANS_DC_OUT_DQ:RMSMon 	K1:PSL-PMC_TRANS_DC_OUT_DQ:SensMon 	K1:PSL-PMC_TRANS_DC_OUT_DQ:LTF
K1:PSL-PMC_TRANS_DC_OUT_DQ:RMon 	K1:PSL-PMC_TRANS_DC_OUT_DQ:SRMon 	K1:PSL-PMC_TRANS_DC_OUT_DQ:LTA
K1:PSL-PMC_MIXER_OUT_DQ		
K1:PSL-PMC_MIXER_OUT_DQ:TimeSeries 	K1:PSL-PMC_MIXER_OUT_DQ:Spectrum 	K1:PSL-PMC_MIXER_OUT_DQ:Spectrogram
K1:PSL-PMC_MIXER_OUT_DQ:RMSMon 	K1:PSL-PMC_MIXER_OUT_DQ:SensMon 	K1:PSL-PMC_MIXER_OUT_DQ:LTF

Web-Based Tools

[Single Channel Analysis](#)
[Coherence Analysis](#)
[Correlation Map](#)
[Bruco](#)
[Detection Range](#)
[Daily Summary page](#)

Date:

GPS Time: 1134572417
 Local Time:
 2015 Dec 20
 00:00 JST

Channel List:

[make channel list](#)
[select channel list \(Default\)](#)

Channel 1:

K1:PSL-FSS_FAST_MON_OUT_DQ
 K1:PSL-FSS_MIXER_OUT_DQ
 K1:PSL-FSS_PC_MON_OUT_DQ
 K1:PSL-FSS_REFL_DC_OUT_DQ
 K1:PSL-FSS_SLOW_MON_OUT_DQ

Parameters:

For General
 Duration: sec. (default is 32s)
 Freq. band: Hz ~ Hz
 (default is from 0Hz to Nyquist freq.)

Monitors:

Pearson Correlation MIC

plot view

HasKAL

GPS Time: 1134572417 (2015-12-19 15:00:00 UTC)

duration: 32s Freq. band: 0 - fNyquist Hz

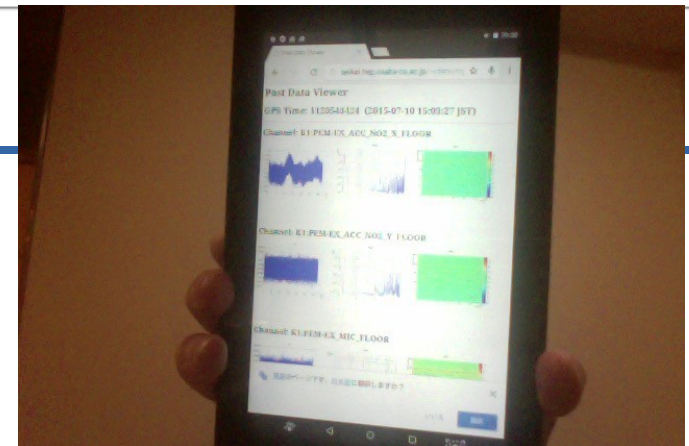
	K1:PSL-FSS_FAST_MON_OUT_DQ	K1:PSL-FSS_MIXER_OUT_DQ	K1:PSL-FSS_PC_MON_OUT_DQ	K1:PSL-FSS_REFL_DC_OUT_DQ	K1:PSL-FSS_SLOW_MON_OUT_DQ
K1:PSL-FSS_FAST_MON_OUT_DQ	1.00000	0.01447	0.02042	NaN	0.01939
K1:PSL-FSS_MIXER_OUT_DQ	0.01447	1.00000	0.01804	NaN	0.01404
K1:PSL-FSS_PC_MON_OUT_DQ	0.02042	0.01804	1.00000	NaN	0.02279
K1:PSL-FSS_REFL_DC_OUT_DQ	NaN	NaN	NaN	1.00000	NaN
K1:PSL-FSS_SLOW_MON_OUT_DQ	0.01939	0.01404	0.02279	NaN	1.00000

Get URL

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[Next >](#)

Real time quick look page is [here](#)

Powered by [HasKAL](#)



Detchar software

相関関係を
調べる

Glitch Monitor

非定常雑音モニタ

- Line Finder
- Line Tracking
- Line Removal

発振などの
ラインモニタ

- Rayleigh Monitor
- Non-Gaussianity Monitor
- RMS Monitor
- Noise Floor Monitor

ガウス性、定
常性、非ガウ
ス性

- Time-Series Monitor
- Spectrum Monitor
- Spectrogram Monitor

データの様子、
スペクトル

- Sensitivity Monitor
- Range Monitor
 - Inspiral
 - Inspiral-Merger-Ringdown
 - Ringdown
 - Stochastic

重力波への感度

- Coherence Finder
- Multiple-channel coherence finder (BruCo)
- Pearson correlation Finder
- NonLinear correlation Finder

- Realtime Quick look webpage
- Daily summary webpage
- GUI Interface
- Web-Base Interface
- Command-line Interface

インター
フェース

- Health monitor
- Globally Correlated magnetic noise
- Violin mode
- Multi-channel analysis
- Newtonian noise
 - Effect of water inside the mountain

Example : GW150914

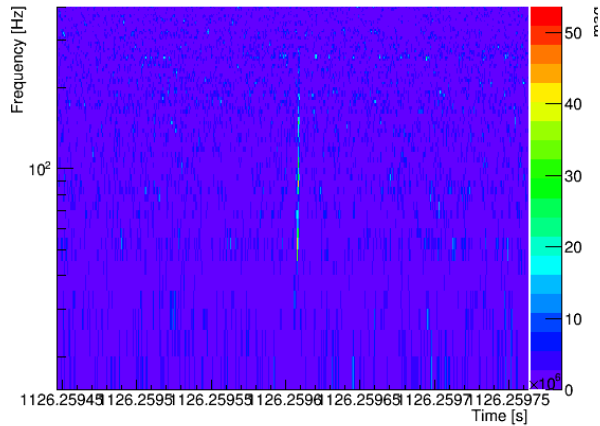
Data Characterization around GW150914

<http://seikai.hep.osaka-cu.ac.jp/~chino/GW150914/characterizeGW150914.html>

Glitch pipeline

hayama

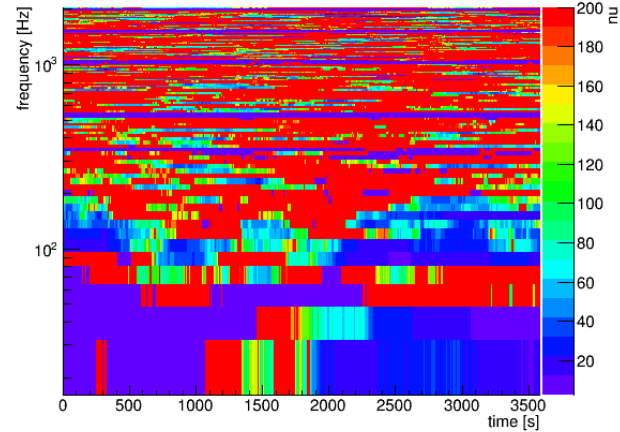
pixelSNR spectrogram



Non-Gaussianity

Yamamoto

SRMon L1:LOSC-STRAIN (p=0.99, d_{FFT}=1s, duration=512s, dt=4s, df=16Hz)

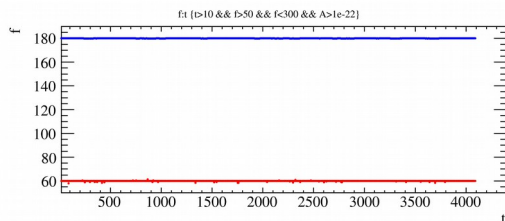
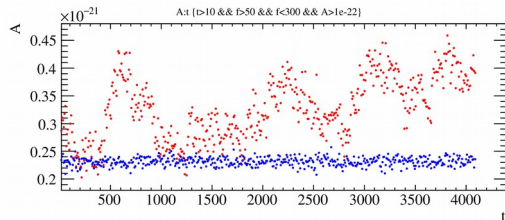
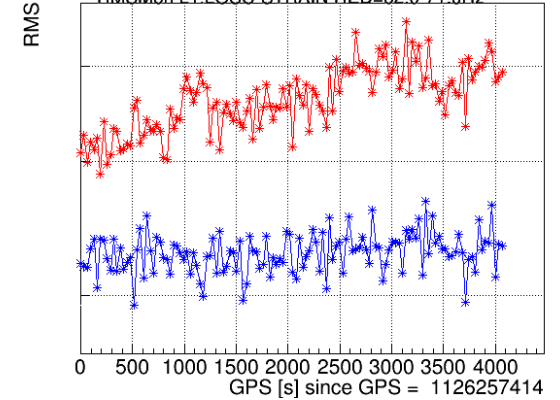


BLRMS (60~70Hz)

Yuzurihara

RMSMon H1:LOSC-STRAIN BLUE=62.0-71.0Hz

RMSMon L1:LOSC-STRAIN RED=62.0-71.0Hz



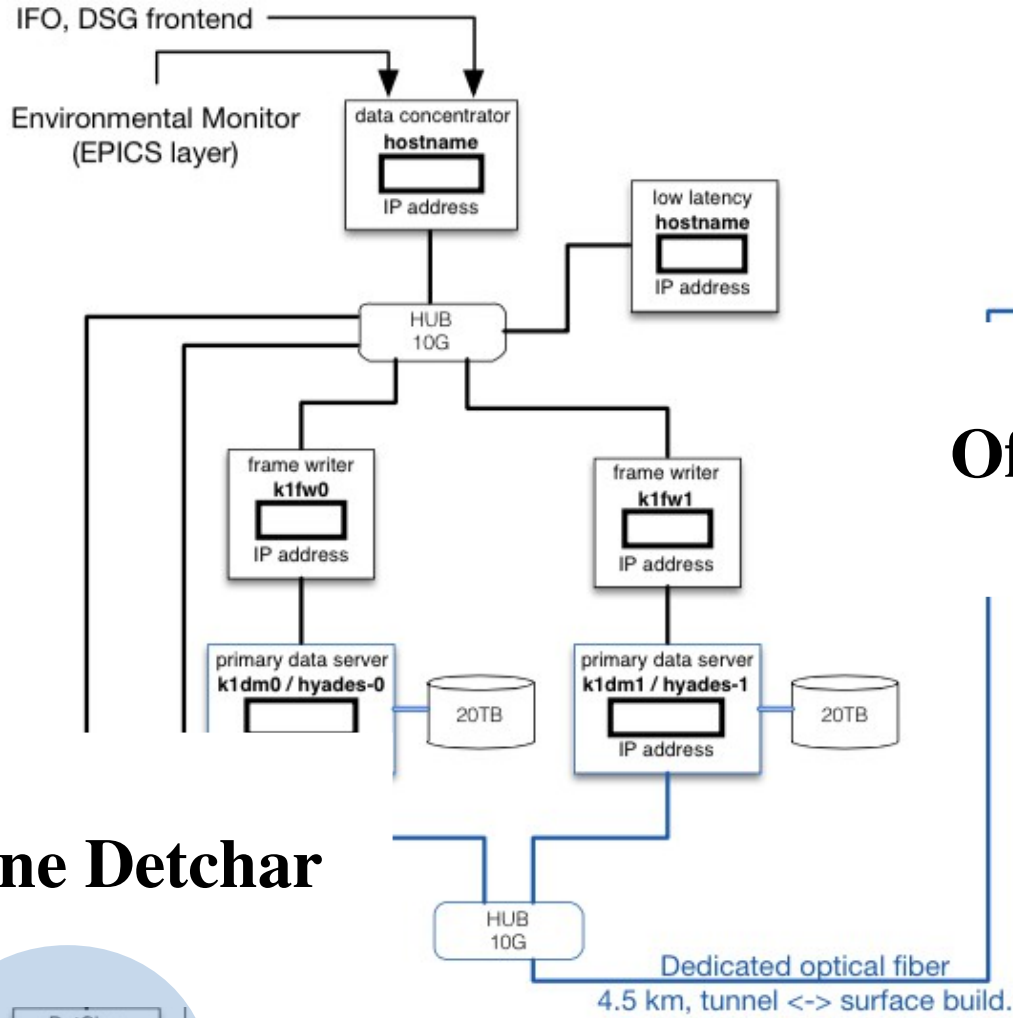
Line Tracking

Ueno

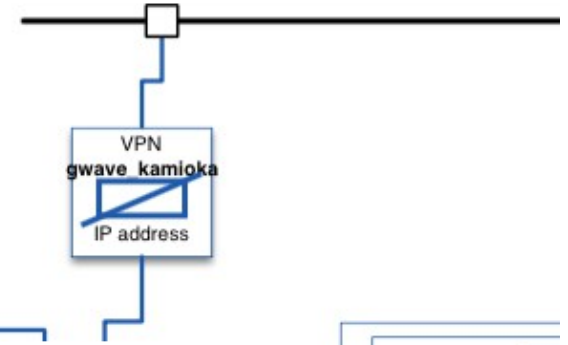
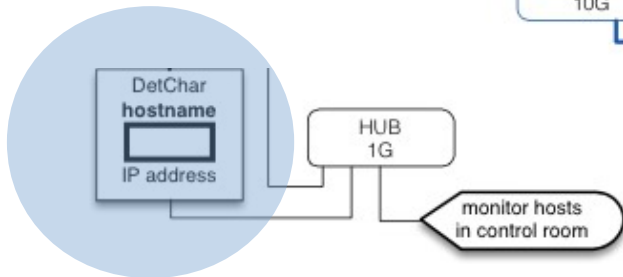
Toward bKAGRA

- **Addition of Guardian info to the webpage(also for iKAGRA)**
- **Initial PEM plan will be finished in ~ this summer.**
- **PEM injection system**
- **Chanel selection to monitor deeply**
 - **With PEM injection study(2016-2017)**
 - **With Subsystems (2016-2018)**

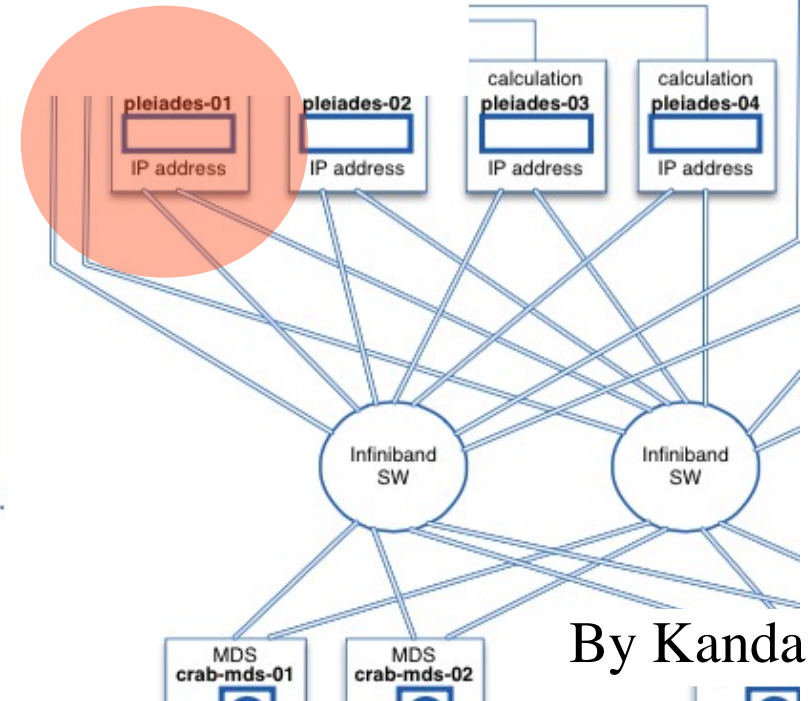
Network



Online Detchar



Offline Detchar



By Kanda