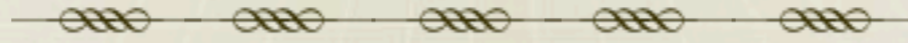


Report on detector characterization

Kazuhiro Hayama
detector characterization team



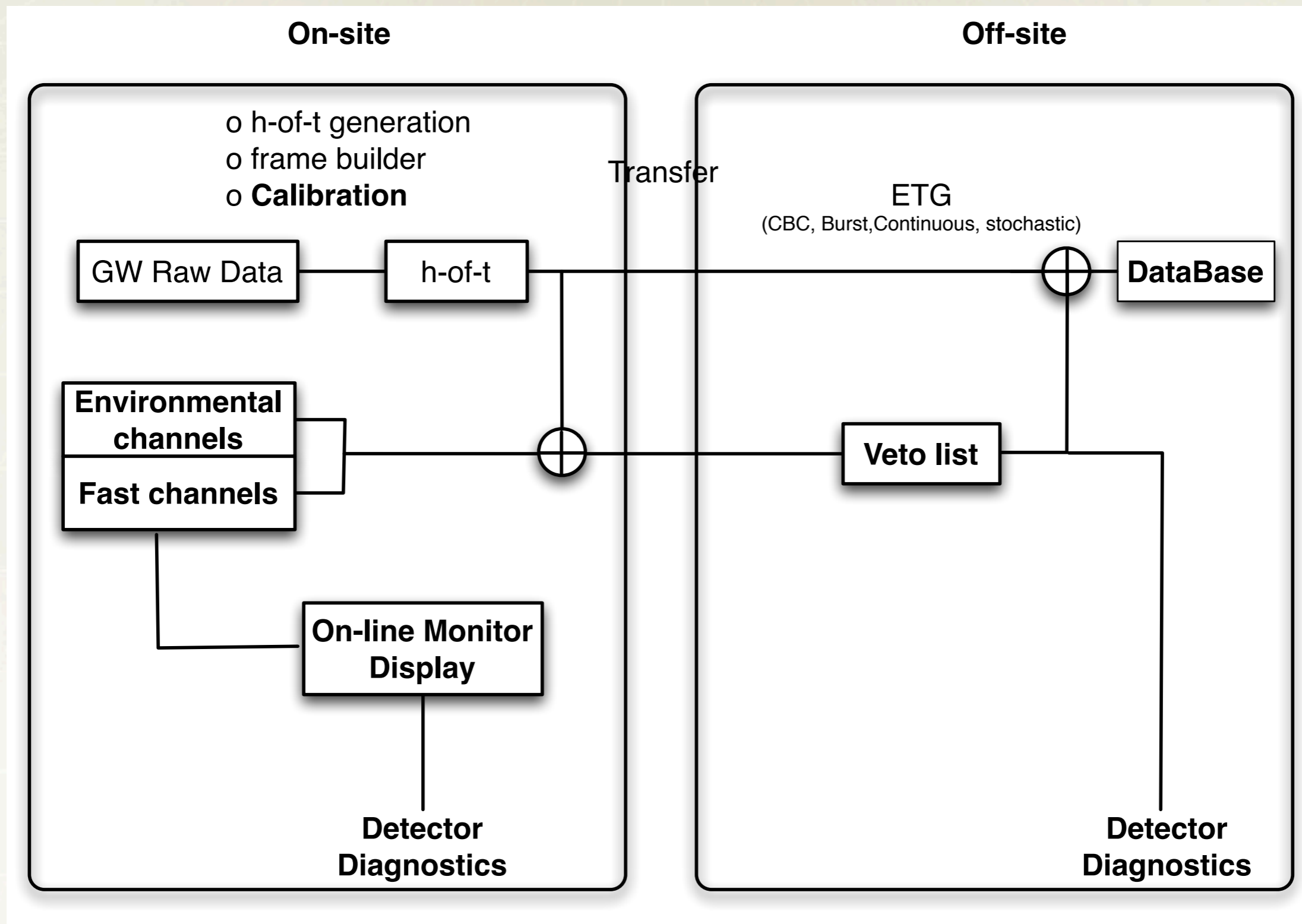
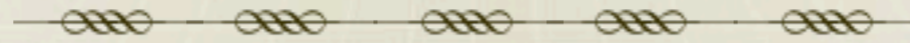
● Commissioning stage

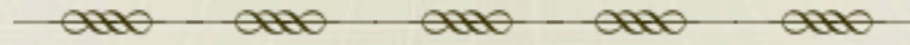
With each subsystem,

- Tools for subsystem diagnostics
- Support to kill noise sources
- Calibration (with MIF, DGS, DMG etc)

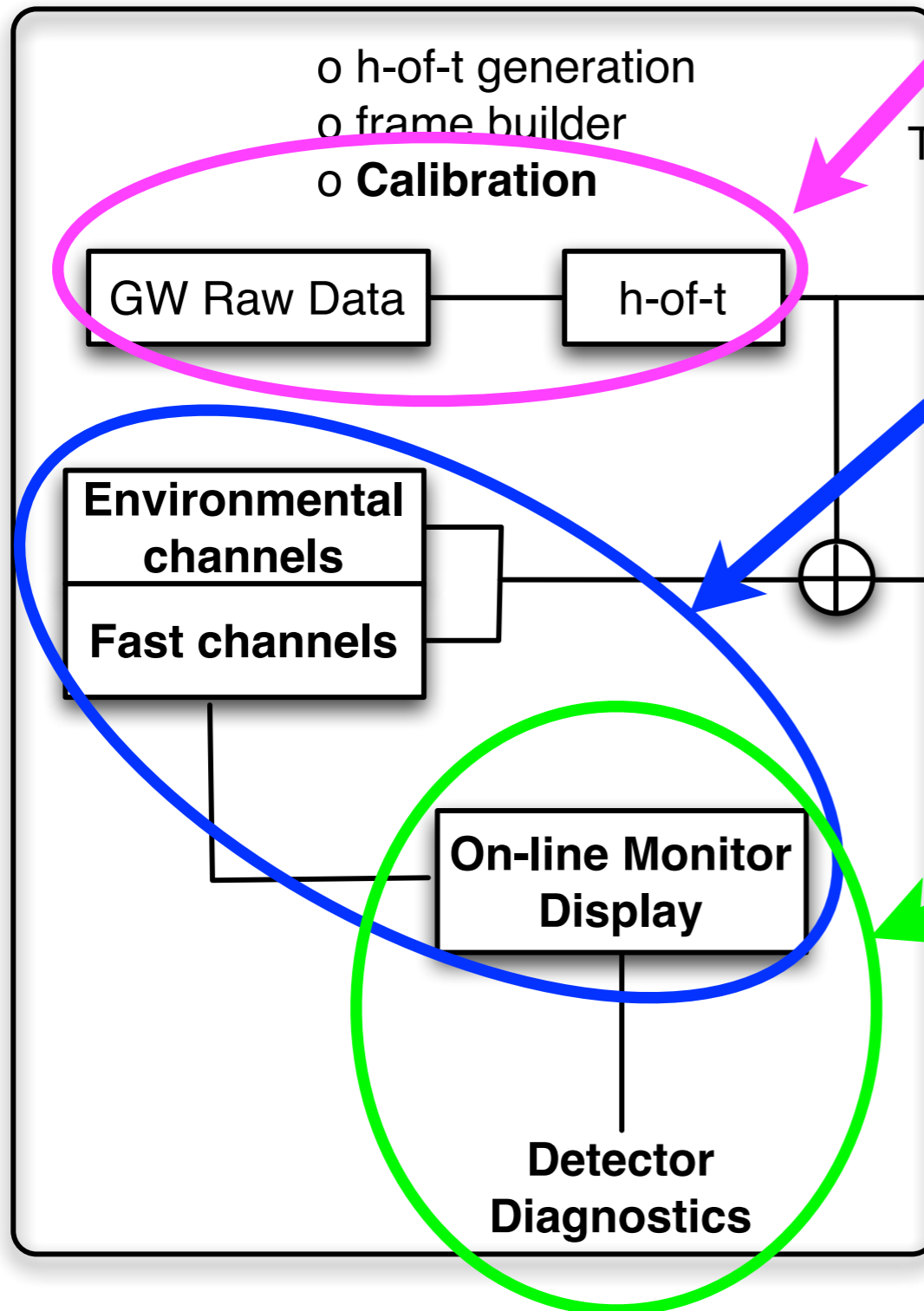
● Observation stage

- Veto analysis (rejection of glitches)
- Noise modeling to improve false alarm rate





On-site



Time domain calibration

On-line display of auxiliary, PE, GW channels

Hardware injections (GW-Seis mon correlated)

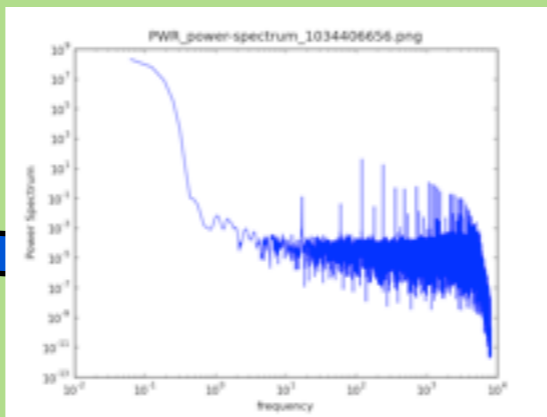
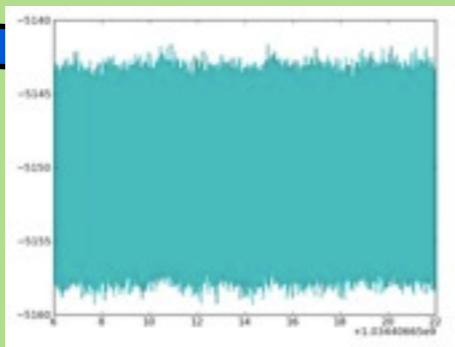
Detector Characterization

Inst. Mon



Laser Intensity

16s



RT WS



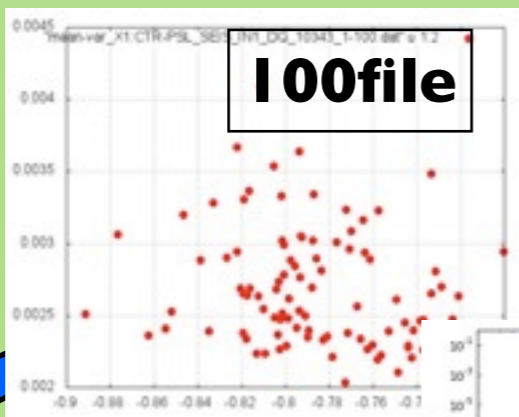
RealTime update @16s

Env. Mon

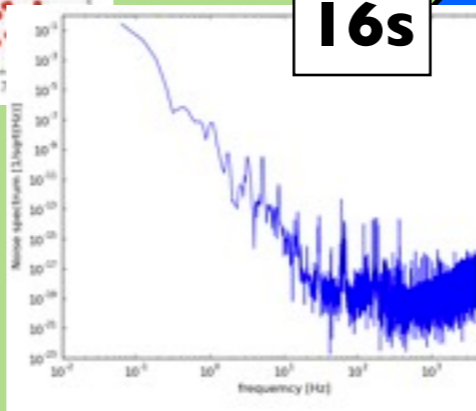


acce.

100file



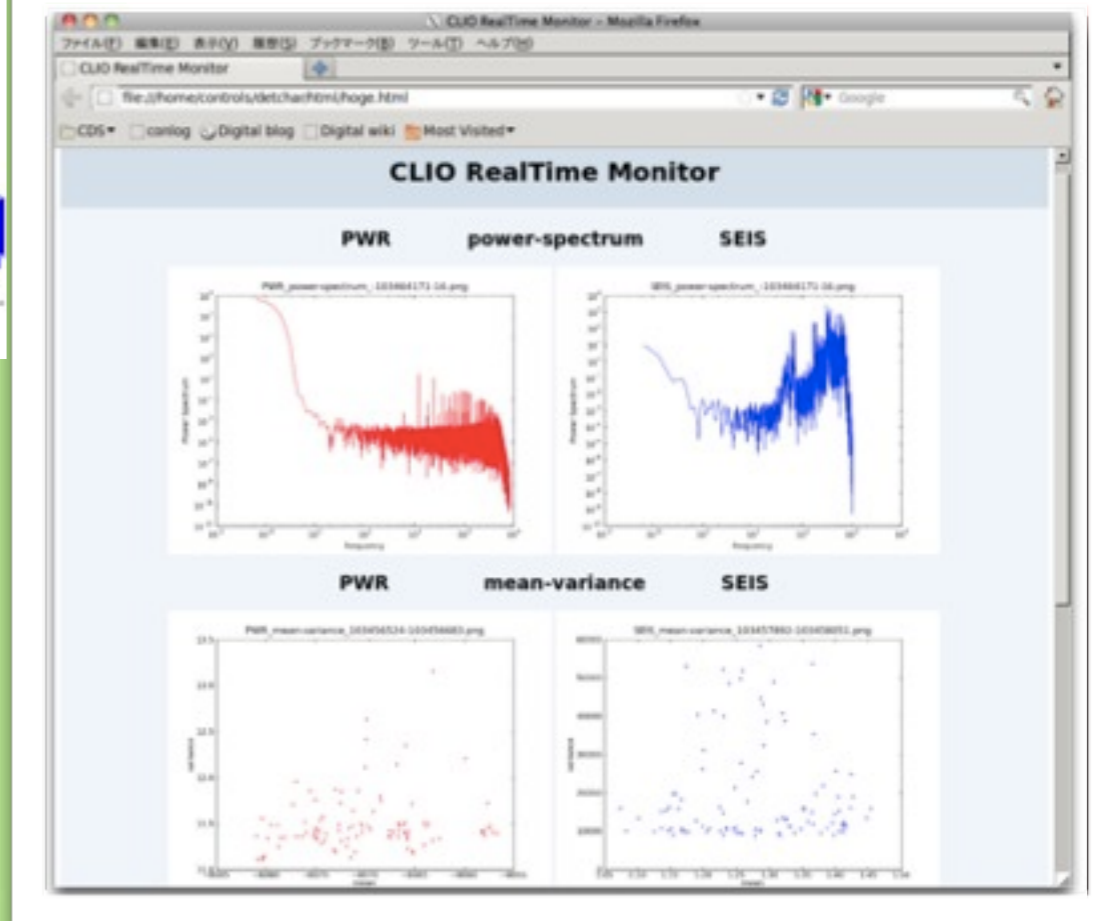
16s



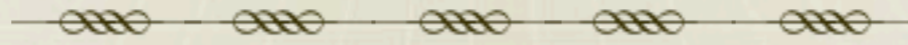
Sens. Mon



CLIO



K.Tanaka



Calibration

Convert to physical unit

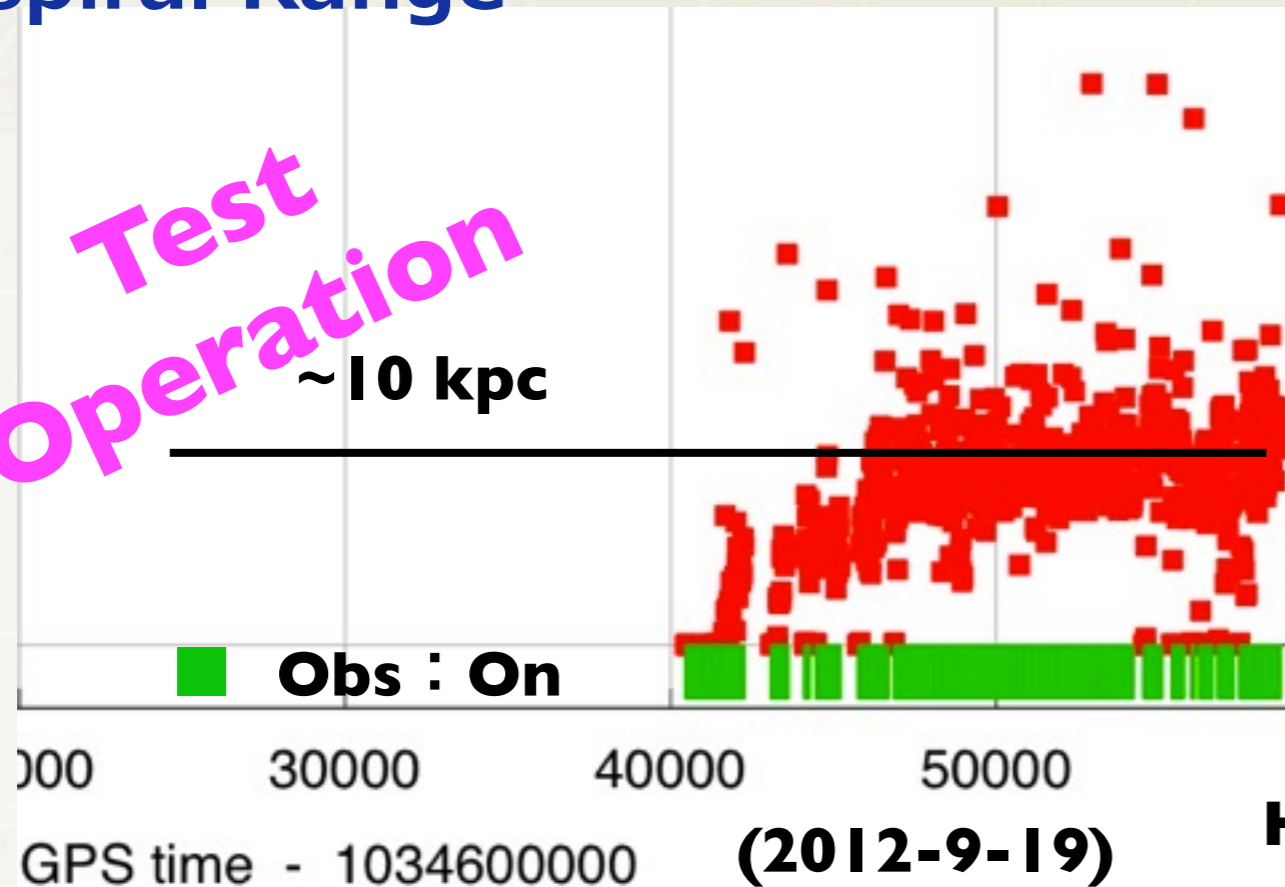
Processing on time-series data

Generation of filters of TF

→ various kinds of analysis

Inspirational Range

Test Operation
~10 kpc

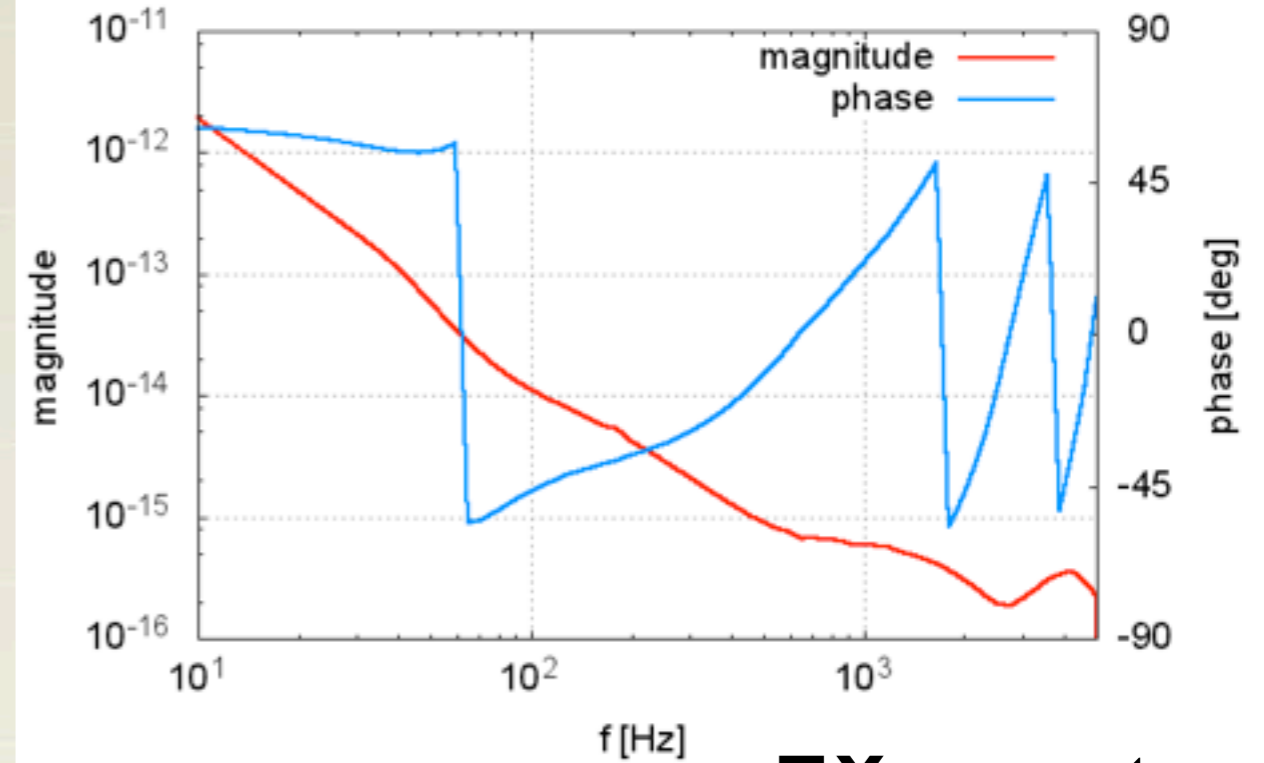


- Real time display of the inspiral range
- Total locked time ~13hrs

H.Yuzurihara

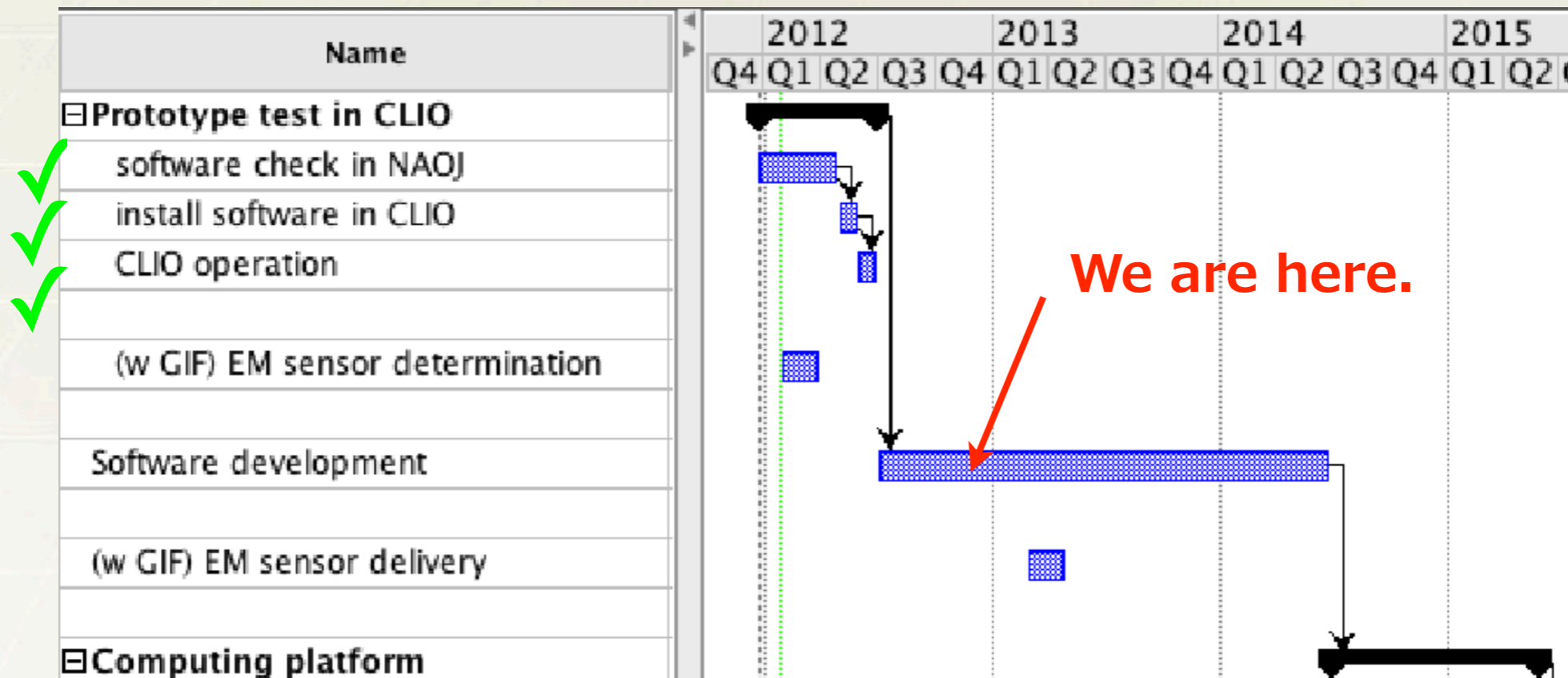
Estimation of TF

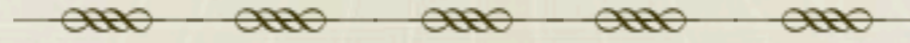
estimation of transfer function



T.Yamamoto

- System installed in NAOJ
- System installed in CLIO
- Test running during CLIO test operation.



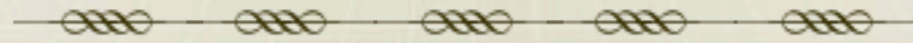


For commissioning

- **subsystem diagnostics**
 - **Method for localization of noise sources**
 - **Evaluation of data quality**
 - **Sophistication of on-line monitor display**
 - **Calibration**

For Observation

- **Veto analysis**
 - **Method for distinguish triggered events are GW or not**
- **Data quality flag**
- **Distribution of data quality information to both internal and external collaborators**



We discussed with K-detchar on our collab. projects and set our goal in last Dec. and this Feb.

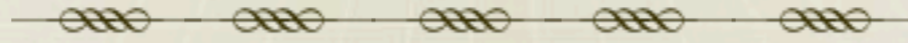
Goal:

Development of a method for

localizing noise sources using auxiliary channels and PEMs.

Support to kill noise sources

- So far several groups in LSC(including KGWG) have made their efforts on a **post-processing analysis (mainly Veto)** to distinguish whether triggered events are glitches or not.
- Our project focuses on **a tool useful for commissioning.**

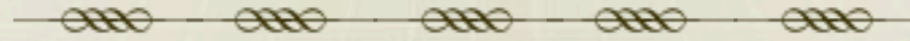


- **Event detection pipelines (K)**
- **Future selection statistics (t- or z- statistics) (K)**
- **To measure channels' responsibility for noise events(J)**
- **Classification of noise events (J)**
- **Integrating these information, localize the noise sources.**

Develop the pipeline using CLIO data, and LIGO, Virgo data.

o First exam is to localize hardware injection we generated during last CLIO operation.

o Other exams are to do same for noise identified already in LSC



- There are several discussions
 - The Shadow monitor to reduce effects of violin modes.
→ Particularly, burst searches should be improved.
Evaluate what impact the monitor gives on data analysis?
 - Correlated environmental noise in global detector network.
→ Stochastic GWB search should be affected.
 - Calibration accuracy
- Great to have your suggestion what kind of monitors, evaluation, etc are useful for your subsystems.