

Report on KAGRA detector characterization

Kazuhiro Hayama
on behalf of detector characterization group

Detector Characterization activities



- 望遠鏡の状態、周辺の雑音環境を把握し、望遠鏡改善、運転改善に役立つためのシステムを開発する。

(ノイズバジェットツール、DTT(オシロスコープ、フィルタ、チャンネルチェック etc)、グリッチ、ライン、ガウス性等の各種モニター、GUIインターフェース、相関磁場の調査、バイオリンモードの影響...)

- データの質を評価し、コラボレーション間で共有する。

(Data quality flag、データベース、...)

- 雑音解析の結果を重力波探査に反映し、より質の高いサイエンスに貢献する。

(Veto 解析、...)

DetCharプロジェクト

Primary projectとSpecial projectに分け、P-が本筋で、S-は短期的または本筋に入れるために検討するプロジェクト。P-を優先して進め、S-は適時チームを結成して進める。

Primary Projects

- To maintain Diagnostics Test Tool(Hayama, Miyakawa)
- Detchar GUI (Hayama)
- Glitch Monitor (Hayama)
- Line Monitor (Itoh, Kokeyama)
- Gaussianity Monitor (Hayama)
- Noise Budget(Hayama, Miyakawa)
- Health Monitor
- Data base
- Quality flag(Hayama, Tasyumi)

Special Projects

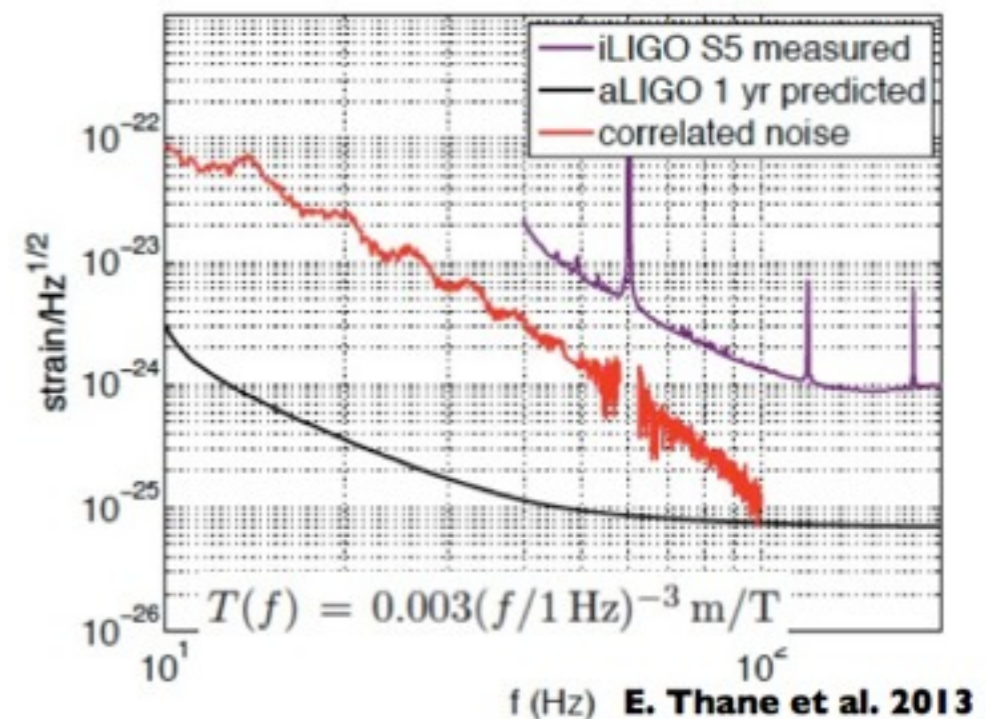
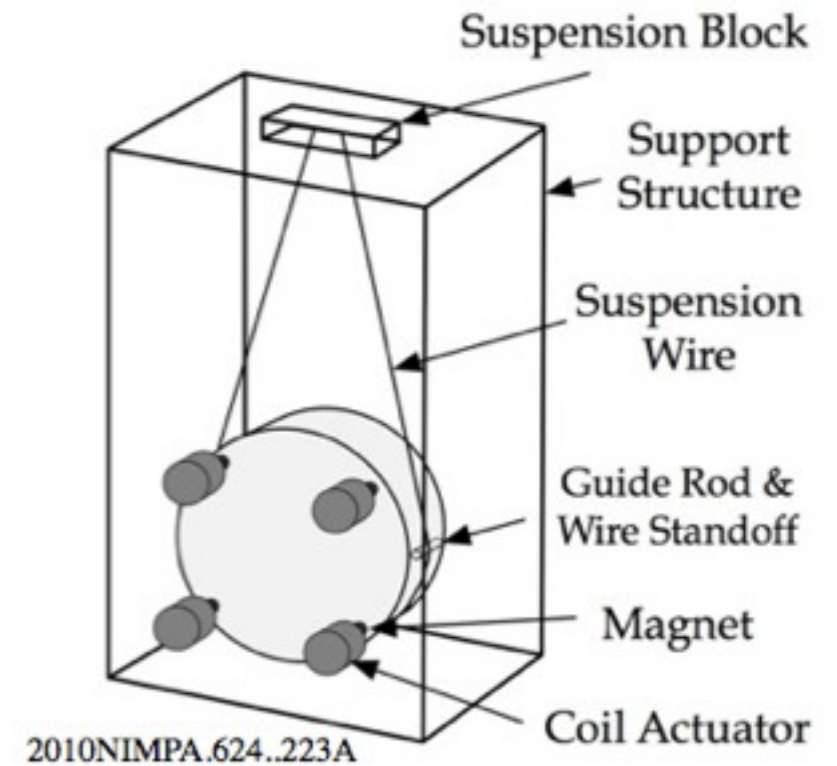
- Globally correlated noise (Nishizawa, Hayama, ...)
- Violin mode(Hayama)
- Multi-Channel Analysis (Hayama with Korea detchar, Mano)
- Detchar shift plan(Hayama)
- Newtonian Noise(Agatsuma)

Measurement of the magnetic fields at KAGRA site



○ Motivation

- KAGRA will use Magnet-Coil actuator to control mirrors.
- A criteria for current plan of arrangement of magnets is $\sim 10\text{pT}_{\text{rms}}$ @ low frequency
- Non stationary noise caused by the magnetic disturbance.
- Schumann resonance may limit the sensitivity of SGWB search below 100z. We have to know the case of KAGRA. Firstly to know the transfer function of M from outside to inside.
- Data taking for developing multi-channel analysis. Collaboration with Korea



Measurement of the magnetic fields at KAGRA site



We will measure the magnetic fields in 21-25 October

- **Participants: Uchiyama, Miyakawa, Hayama, Ono, Yano**
- **Study on the environmental magnetic field at KAGRA site. Getting data which help to decide the configuration of a coil-magnet actuator which controls a mirror.**
- **To obtain transfer function of the magnetic fields outside to inside in order to know influence of Schumann resonance.**
- **To see whether our magnetometers are enough sensitive to measure the environmental magnetic field or not. If the data is occupied by internal noise of the magnetometer, we need to have better magnetometer.**
- **To get several PEM data (magnetic fields and accelerometer)**

Current status



- **[Done] To specify where we measure the magnetic fields**
- **[Done] To get two magnetometers.**
- **[Done] To get two data loggers with enough channels**
- **[Partial] To test the magnetometers**
- **[No] To test the data loggers**
- **[No] checklists for the measurement**
- **[No] End-to-end test**

Collaboration



- **Korea**
 - **We have bi-weekly meeting. Mainly for multi-channel analysis.**
- **LIGO**
 - **Exchange current progress, what we/they are doing,..**
 - **Development of detchar software (critical coupling likelihood analysis etc.)**
- **Virgo (New!)**
 - **With Prof. Flaminio's help, we had good progress.**
 - **We started close collaboration with Virgo detchar: Sharing Virgo PEM data, exchange information, collaborative development software.**