Korean Group

12th KAGRA face-to-face Meeting

August 28, 2015

on behalf Korean Gravitational Wave Group

Members

- Experiment:
  - Tai-Hyun Yoon (Lead, Korea Univ.), Kyuman Cho (Sogang U.), Jaewan Kim (Myungji U.)
- Data Analysis
  - Hyung Won Lee (Lead), Jeongcho Kim (Inje U.), John Oh, Sang Hoon Oh, Edwin Son, Hwansun Kim (NIMS), Chunglee Kim(Yonsei Univ.), Gungwon Kang, Heesuk Cho (KISTI), Chang-Hwan Lee, Young-Min Kim (PNU), Hyunkyu Lee, Kyungmin Kim (Hanyang U.)
- Others (Theory, Astrophysics)
  - Hyung Mok Lee (SNU), Sangpyo Kim (Kunsan Nat. U.)

Computing Support

- Korea Institute for Science & Tech. Info. (KISTI) supports KGWG for its activities including KAGRA Collaboration.
- Current hardware includes 636 CPU cores and 155TB storages
- Current user groups include KAGRA Parameter Estimation Members, for the construction of PE pipeline

Name	*Affiliation*
Kazuhiro Hayama	Osaka City Univ.
Tatsusya Narikawa	Osaka City Univ.
Hideyuki Tagoshi	Osaka City Univ.
Koh Ueno	Osaka City Univ.
Hirotaka Yuzurihara	Osaka City Univ.

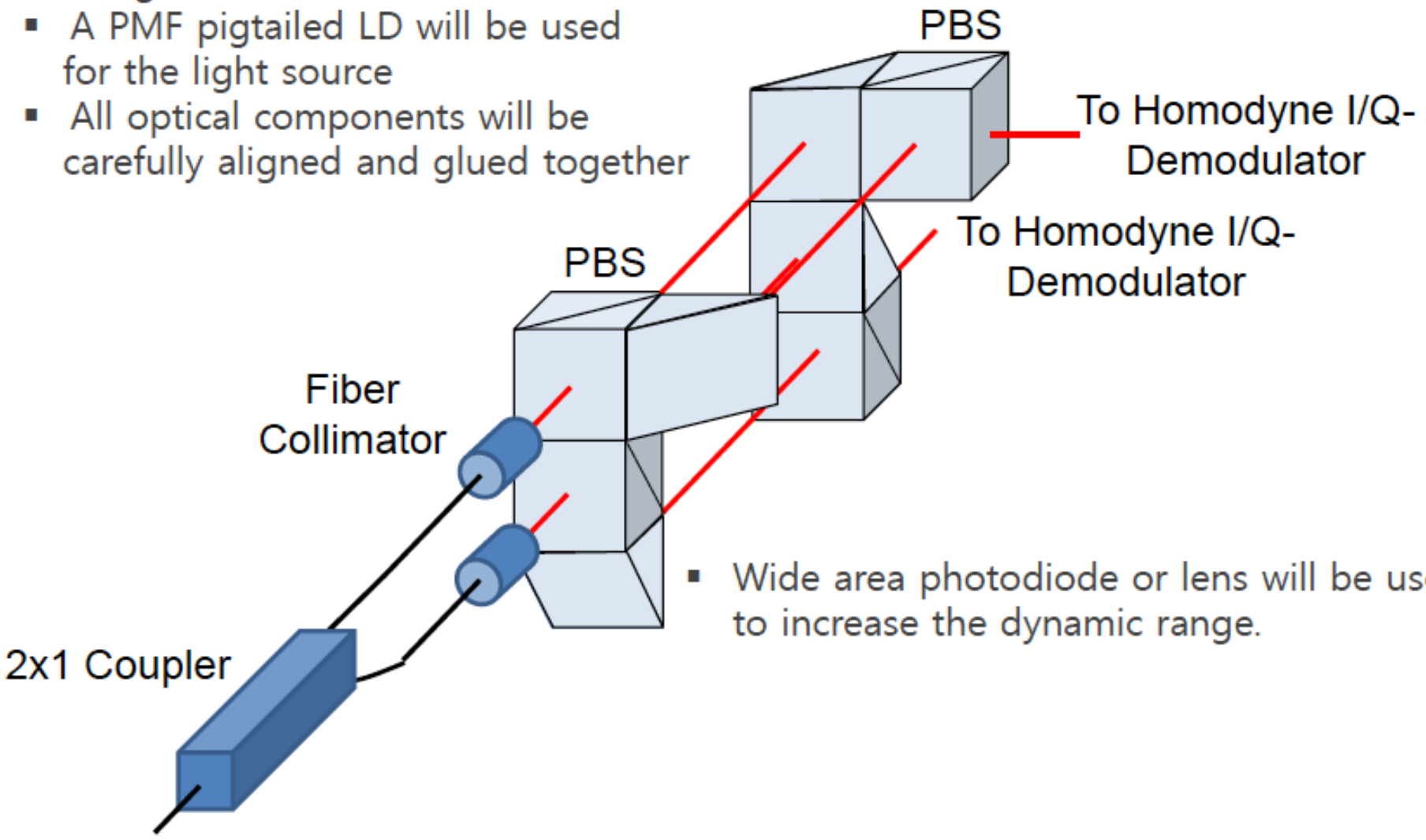
Tilt Sensor for Initial Mirror Alignment of KAGRA

Professor Kyuman Cho, Sogang University

- High sensitivity, wide dynamic, low drift range tilt sensors are very important in initial mirror alignments of KAGRA.
- Optical lever has been used for
  - Local angular alignment of each mirror,
  - Alignment control to lead to lock the interferometer,
  - Monitor drift.
- Prof. Cho proposed new interferometric tilt sensor schemes which, in theory, can provide
  - a better sensitivity,
  - a better stability,
  - a compatible dynamic range to an optical lever.

Proposed Scheme for Tilt Sensor

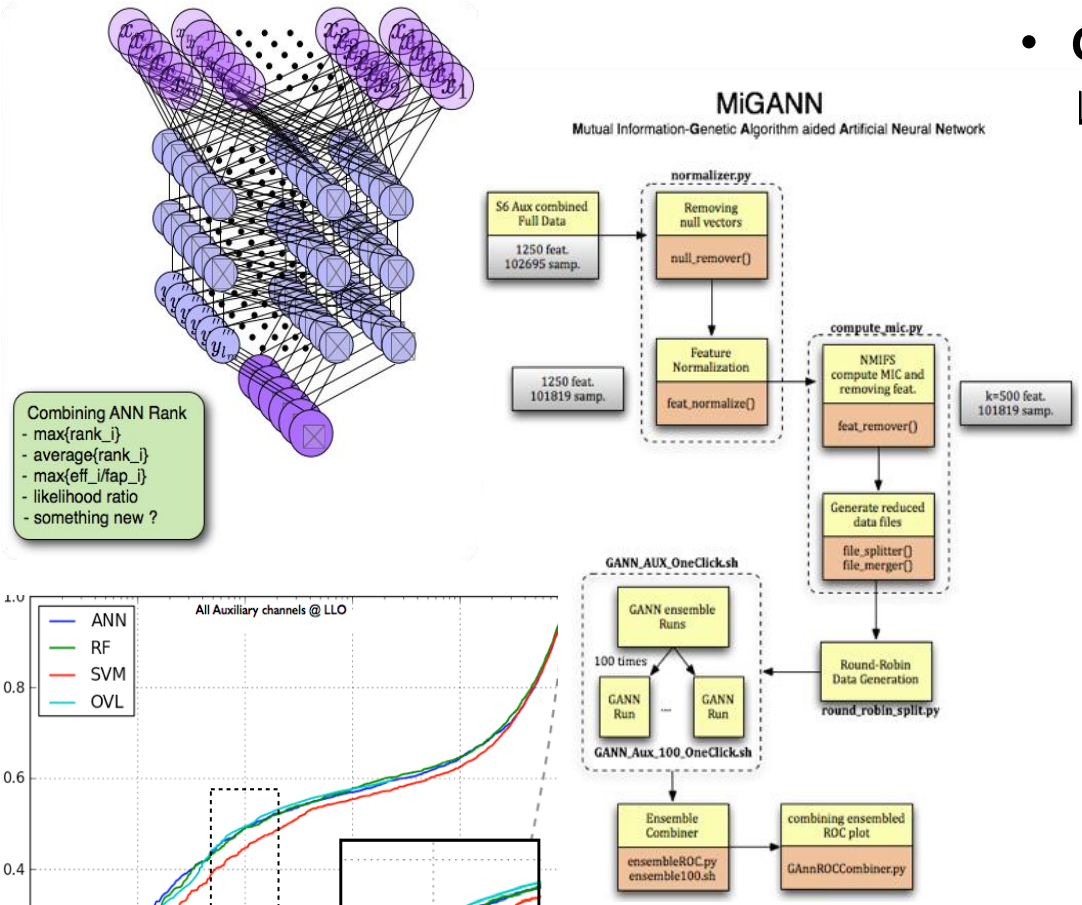
- Two homodyne tilt sensors for pitch and yaw measurements are integrated
- A PMF pigtailed LD will be used for the light source
- All optical components will be carefully aligned and glued together



- Wide area photodiode or lens will be used to increase the dynamic range.

Detector's Characterization @ KGWG

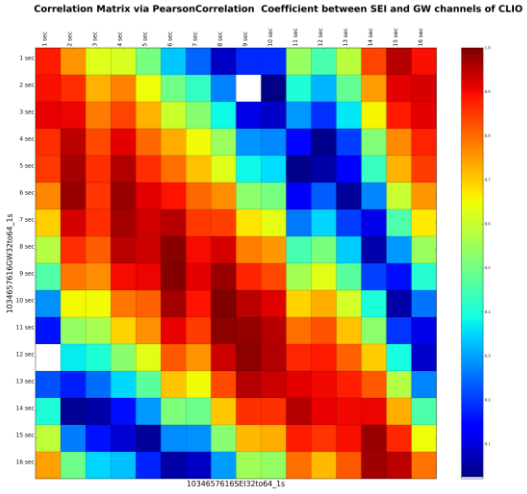
Members:
John Oh, Sang Hoon Oh, Edwin Son, Hwansun Kim (NIMS)
Young-Min Kim, Chang-Hwan Lee (Pusan National Univ.)

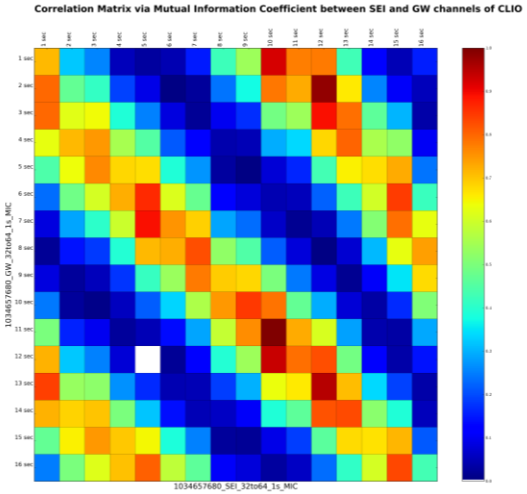


- **Glitch Classification using Machine Learning Algorithms**
  - Artificial Neural Net based Glitch identification
  - iDQ Pipeline (online classification using BDT, ANN, SVM, OVL) in LIGO
    - testing in KAGRA
  - Improving iDQ pipeline: applying the notion of deep neural network

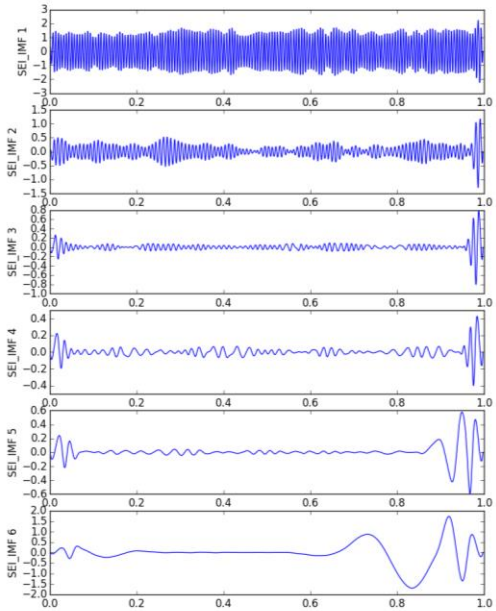
BDT: Bagged Decision Trees of Random Forest
ANN: Artificial Neural Network
SVM: Support Vector Machine
OVL: Ordered Veto List – Conventional Method of Glitch Determination in LIGO

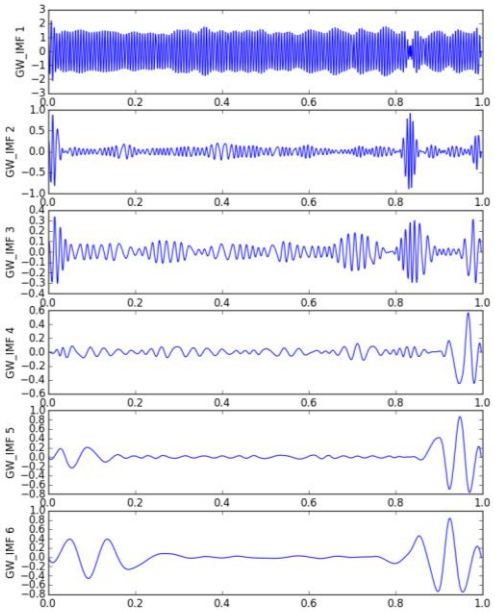
Detector's Characterization @ KGWG

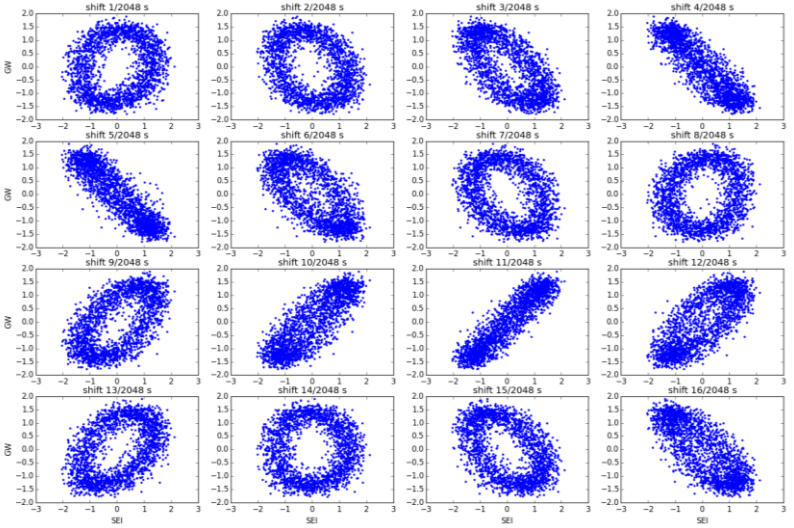




- **Correlation Analysis of CLIO Data**: SEI and GW Channel
  - PearsonR & Maximal Info. Coeff.
  - Generating Correlation Matrix
  : Monitor the correlated aux. channels
- **Event Trigger Generation**
  - Hilbert-Huang Tranform based appoach







KGWG-KAGRA DAS activities

Members:
Hyung Won Lee (Inje U.), Jeongcho Kim (Inje U.), and Chunglee Kim (Yonsei U.)

MCMC Parameter estimation for CBC inspirals
- Effects of amplitude corrections for NS-BH and BH-BH binary inspirals
- Comparison of MCMC performance with the initial vs early-phase advanced LIGO-Virgo
- MCMC PE with more realistic noise realizations (non-Gaussianity)

Waveform Study
- Reviewing the post-Newtonian formalism: TaylorF2
- Developing non-precessing TaylorF2 approximant including amplitude corrections, eccentricity effects

KAGALI development(with Prof. Tagoshi)
- Parameter estimation pipeline implementation for KAGALI

Joint Meetings

- Semi-Annual Meetings
  - 6th meeting: June 20-21, 2014, Seoul National University
  - 7th meeting: December 19-20, 2014, Toyama University
  - 8th meeting: June 27, 2015, Gwangju
- Future direction of joint meetings
  - Merge into F2F meeting?
  - Merge into International meeting?
  - To be decided later