Activities of the KAGRA Data analysis subsystem

Hideyuki Tagoshi (Osaka Univ)

Current Data Analysis Subsystem

Data Analysis Subsystem (DAS):

Osaka Univ: Hideyuki Tagoshi (Chair), **K.Ueno, T.Narikawa**

Univ Tokyo: Y.Itoh (sub-manager),

Nagaoka Tech: H.Takahashi (sub-manager),

Osaka City Univ: N.Kanda, K.Hayama, **T.Yokozawa**, H.Yuzurihara, T.Yamamoto, K.Tanaka,

Niigaka Univ: K.Oohara, Y.Hiranuma, M. Kaneyama, **T. Wakamatsu**

 (Brown: Core members, **Bold face**: New members, Red: New PD)

Total: 15 (4 new members on April 2013)

Core members' meeting (with DMG) : every Friday 16:30-17:30

Scope of DAS:

*   R&D of the new data analysis methods
*   Development of the software package
*   Analysis of real data and GW event search
*   Production of scientific results and writing papers

Activity of KAGRA DAS

➤ **iKAGRA target**

   Operation of the whole analysis pipeline which includes analysis of data
   and production of the scientific results.

➤ **Ongoing works**

- Development of the KAGRA data analysis package

   Purpose:

   To develop common software which can be shared among KAGRA's collaborators.
   To proceed the data analysis efficiently (by avoiding duplicate production
      of the same code)
   To have ability to cross-check the results with LSC and Virgo at certain level.

   Policy :

   Develop better software than existing software, at least, at some points.
   Co-exists with LSC software.

   Current situation:

      Writing documents for
         C language coding rules (Itoh) (finish soon)
         Definition of basic formulas, conventions, .. (Tagoshi, Itoh) (finish soon)
      Research on the C++ coding rules (H.Takahashi)

Data Analysis School

1st KAGRA data analysis school
- Sept. 3-5, 2012 at U. of Tokyo
- Number of participants: about 70
- Basics of matched filtering

2nd KAGRA data analysis school
- Feb. 20-22, 2013 at NAOJ, Mitaka, Tokyo
- Number of participants: about 60
- Gravitational wave burst search

Development of Data analysis package

Main person in charge (Preliminary)

This list must be updated

Common parts:

    Calibration: to be determined
    Data handling: Kanda
    veto: Hayama
    Detchar: Hayama
    Data viewer: Oohara
    Event viewer: Oohara
    Data simulation: T. Yamamoto

CBC: Tagoshi
Burst: Hayama
Continuous: Itoh
Stochastic : (Radiometry) Osaka CU
Ringdown: Kanda
HHT: Takahashi

Future collaboration with LSC-Virgo

May 20-24, 2013: GR Science workshop @ South Padre Island (Texas)
    Tagoshi attended
    Talked to many LSC people (G.Gonzalez, L.Cadonati, D.Brown,
                                            C.Hann, C. van den Broeck, B.Owen,...)

June 3-7, 2013: YKIS2013 @ YITP Kyoto Univ
    Meeting with B.Allen, P. Brady, P. Sutton

Discussion (or chat) on:

* Some technical details to share data
  (Frame, data store method, data base,...)

* Current structure of each subgroup of LSC

Future collaboration with LSC-Virgo

I also asked them:
- What is the best way to proceed collaboration,
once KAGRA achieves certain level of sensitivity?

In the case of LIGO-TAMA analysis, LSC made special teams for the
joint analysis (inspiral and burst).
In that case, analysis were limited to the coincident analysis
(no data sharing) and the joint analysis scheme worked well.

But for the future advanced LIGO-Virgo-KAGRA analysis, much more
close relationship is desired to maximize the
scientific outcome from the data, and many people consider
that data sharing is natural or must be done.

Thus, most of above people suggested, (in some way),
the preference for KAGRA member to join each LSC subgroups
and perform the analysis jointly.

Future collaboration with LSC-Virgo

Although nothing is determined yet in our side, there is an obvious fact:

Total Number of subgroups in each subgroups of LSC (CBC, Burst,...)
is larger than the number of our group members.

We hope to increase the number of our members by the time of bKAGRA.
We think we will have more people in our group in the near future.
But the prospect is not so bright.

How about this Korea-Japan project?

I think that, although it took time, we can now start to consider what we want
to do with KAGRA data only, and what we want to do with LIGO-Virgo, and
what we want our Korean colleagues to do for KAGRA.

Other individual research activities

Individual research activity

(This list is based on the application to the JPS meeting and other conferences)

➤ **T. Yamamoto, N. Kanda** (Osaka CU)
• Calibration of the real data of laser interferometer (Generation of h(t))

➤ **H. Yuzurihara, N.Kanda** (Osaka CU)
  Detection of GW signal from the cusp and kink of the cosmic string.

➤ **K. Tanaka, N. Kanda** (Osaka CU)
  GW radiometry using GPU

➤ **Yokozawa, Asano, Kanda, et al.** (Osaka CU)
  Detection of GW from Supernovae
  Coincidence detection of GW and Neutrino signal from Supernovae

➤ **Kanda** (Osaka CU)
  On the determination of the source direction (accuracy, speed,)

Individual research activity

➢ A.Toritani, N.Kanda, (Osaka CU), Y.Itoh (U Tokyo)
    Quantization noise in KAGRA data

➢ H. Takahashi (Nagaoka Tech), Y.Hiranuma, K.Kaneyama, K.Oohara
    (Niigata U)
    Application of the Hilbert-Huang transform (HHT) to GW data analysis
     (HHT: a time-frequency analysis method using Hilbert transform and
       "Empirical Mode decomposition")

Individual research activity

➢ K.Ueno, T.Narikawa, H.Tagoshi (Osaka U)
- Low latency search for inspiraling compact binaries
- Constraining graviton oscillation by detection of GW from inspiraling compact binaries (with Kyoto group)

➢ H.Tagoshi (Osaka U)
- Evaluation of parameter estimation accuracy using full waveform of the PN wavefroms of inspiraling compact binaries (with Indian collaborators)
- Analysis of the NS-NS merger data from Numerical Relativity simulation by Kyoto Group   (Hypermassive neutron stars produced after the merger)