

# Status of burst searches

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On behalf of the burst working group

# Status

- Searches
  - All sky searches
    - cWB with Stokes parameters (Mervyn)
    - Butterfly filtering (van Putten)
  - Triggered searches (Sne, GRB, SGR)
    - cWB with Stokes parameters (Mervyn)
    - Butterfly filtering (van Putten)
- Observation run (See Mervyn's talk)
  - ER2 2019Jul (pipeline test)
  - ER3 2019Dec (pipeline test, result page)
  - ER4 2020Feb (first application of LVK run!!)
  - K-G joining observation (April)
- R&D
  - 17 projects in the burst group (will show later)

# GEO-KAGRA observation

## GEO-KAGRA Burst searches

### LVK team

- Data (KAGRA: Kanda(DMG group), Inoue(Calibration group), LV : James Clark, calibration?)
- Data quality ( KAGRA : Kozakai, Maurice, GEO : Borja, Nikhil)
- Searches (KAGRA : Mervyn(cWB), Maurice(Butterfly filtering), LV : Marek, Sergey, Marco Drago )
- GRB, SN triggered search (LV : P Sutton, X-pipeline, KAGRA : Mervyn, Maurice)

Analysis on going

# R & D project

- EXCEL file

# Osaka City University

1. Developing on-line realtime transient event monitors with low latency  $h(t)$ .

In 2019-2020 spring, our unit in Osaka City Univ. have been developing (semi-)realtime monitor using low latency  $h(t)$ . We realized to do some low latency  $h(t)$  processes and to show via web page.

Below are items that we are developing.

- 1) Web monitor's outline was developed and maintained by (Satoshi Tsuchida(PD)).
- 2) spectrogram (Tomoya Ohashi(M1)) It is already implemented on monitor via web.
- 3) Q-transform (Yuuichiro Kobayashi(M1)) Test program is working.
- 4) Hilbert-Huang Transform (Mei Takeda (D1)) HHT have been developed at Niigata U and Nagaoka U. Takeda is providing HHT for real time monitor now.
- 5) GCN trigger (Tomoya Ohashi).

2. Developing new short transient filter based by Laplace transform (Satoshi Tsuchida(PD) )

3. Further study for supernova GW by using HHT (Mai Takeda (D1))

4. Low latency data providing to the burst pipeline (Nobuyuki Kanda)

# ICRR

Group: ICRR

Members: Bin-Hua Hsieh, Hideyuki Tagoshi,

Collaborators: Hirotaka Takahashi, Kei Kotake, Tomoya Takiwaki

Project: Analysis of GW signals from supernova simulation data with  
NHA method

Comment: We are going apply the method to LV data in the near future

# National Tsing Hua University

National Tsing Hua University

Leader: Albert Kong

Members: Albert Kong, K.-C. Pan, K.L. Li

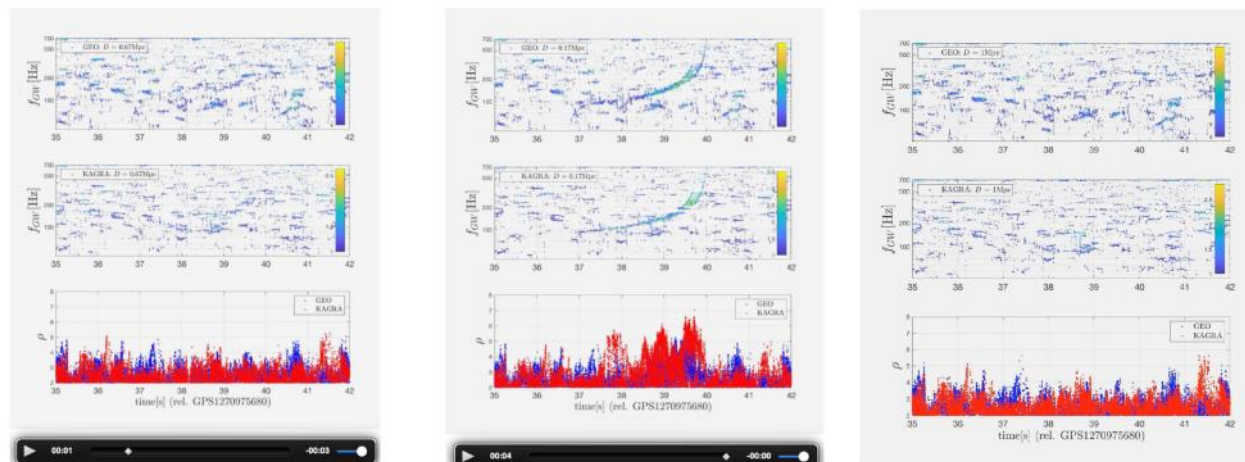
Project: HHT analysis of gravitational wave signals from core collapse supernovae

Status: A poster was presented in the 2019 Dec F2F meeting; an in-depth analysis is being carried out and we are preparing a paper to report the results.

# Sejong University

## GEO-KAGRA sensitivity

- Signal injection using a model DNS across varying distances
- Data snippet adjacent to GRB200415A, whitening over 4Hz intervals
- Butterfly filtering with time-scale of phase coherence  $\tau = 0.25$  s



$D \simeq 0.67$  Mpc

$D \simeq 0.17$  Mpc

GEO-KAGRA around GRB200415A:  
Sensitivity (detection threshold) to DNS:  $D \sim 0.67$  Mpc  
No detection from  $D \sim 3.5$  Mpc:  $\mathcal{E}_{GW} \lesssim \mathcal{O}(1M_{\odot}c^2)$

See

<https://gwdoc.icrr.u-tokyo.ac.jp/cgi-bin/private/DocDB/ShowDocument?docid=11679>



# Tamkang University

- Research unit: remove the glitch in gravitational-wave data with deep learning
- Unit leader: Guo Chin Liu (Tamkang university)
- Group member: Tzu-Ching Lin
- We propose to remove or suppress the glitch in gw data with deep learning. Supervised Speech separation technologies such as GANs (Generative adversarial networks) will be used. It should be useful for the search of burst signal.

# Nagoya University

Research Unit: Nagoya University

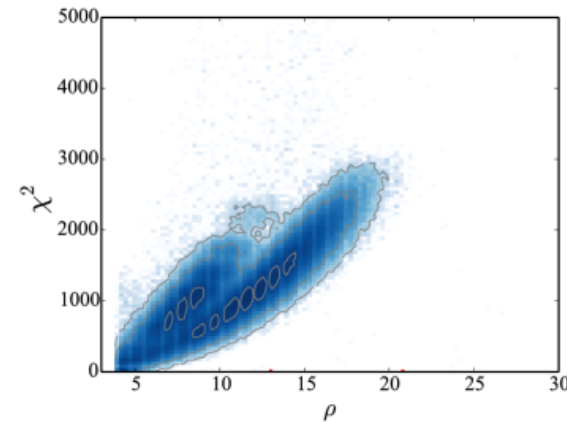
Unit leader: Sachiko Kuroyanagi

Research activity : searching for GW bursts from cosmic strings

- **Current status**

- KAGALI code for template search is developed
- Test is made with LIGO O1 data

Number of event candidates  
After coincidence check: 10910667 → 508239  
Chi-square check: 508239 → 37



- **Future Plans**

- Determine detection statistics and provide constraints on cosmic string parameters independently of LIGO to check the consistency
- Impliment new templates (cf. Blanco-Pillado and Olum, 2017)

# Fukuoka University

all sky search	Chan Leong Man
web based Sme analysis	Satoru Eguchi
	Shota Shibagaki
	Kei Kotake
Stokes parameters	Chan Leong Man
Sparse modeling	Moe Kukihara