

KSC Newsletter

Issue 7

KAGRA entered the observing mode!

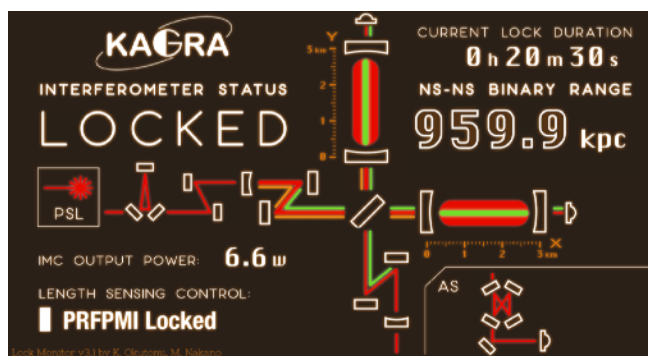
We are operating at Mpc-level finally

After we signed to the memorandum of agreement (MoA) [\[JGW-M1910663\]](#) [\[JGW-M1910664\]](#), with LIGO/Virgo in October, our target has been concentrated to join to Observation 3 (O3) of LIGO/Virgo. The requirements [\[JGW-M1910813\]](#) are to improve the sensitivity of the detector over 1 Mpc in binary neutron-star range, and to clear the readiness checklists of data flows/calibrations/organization. When we first locked the detector on August 23, 2019, the sensitivity was 0.4 kpc. In order to reach our target (10 Mpc), the team so far made great efforts for commissioning and noise-hunting.

The planned date for starting observation was postponed a couple of times. We made engineering run in December, then went back to the commissioning. After the announce of the first lock of the power recycling system on January 26 [\[klog12639\]](#) and OMC readout ready [\[klog12763\]](#), our sensitivity started recording the number as we graphed below.

We declare the start of the observation on February 25 with around 300 kpc level. The team decided to go back to commissioning to try again with the signal recycling configuration. We heard we momentarily locked with dual recycling, but not enough stability for observation.

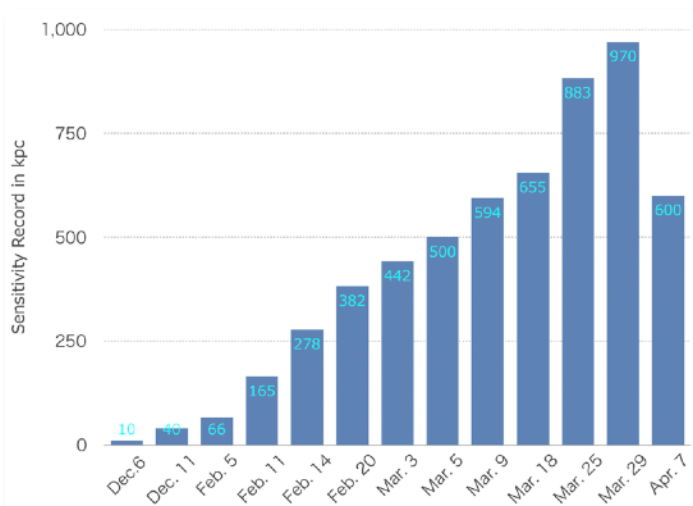
Since our time was limited and we decided to go into the observing run from April 7 for two weeks. However, the new virus COVID-19 changed the situation. Both LIGO/Virgo had to stop their detector from March 24. On April 3, KAGRA proposed to make a joint observation with GEO600 in the framework of LVK network, and core members are discussing details with GEO.



The current record of the sensitivity is 970 kpc on March 29, 2020. [\[klog 13840\]](#)



The moment of declaring the start of observation on February 25, 2020. [Photo from [KAGRA webpage](#)]



Reported records of the sensitivity in binary neutron-star range (in kpc).

Directions

Thanks for your patience, LV colleagues

All of KAGRA members have been accelerating for joining O3. However, we have faced many issues in our preparation processes.

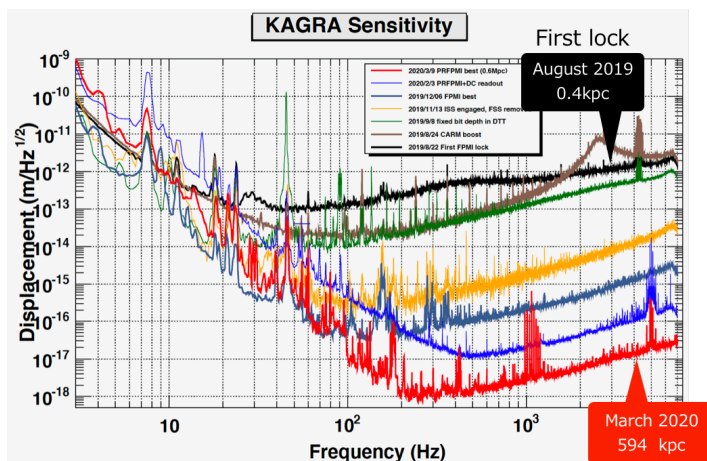
For example, when our data analysis groups tried to join the parameter estimation rotation (PE rota), which is a sort of "shift" participation of running cluster machines, it turned out we need authentication of our group to login to LIGO clusters. We (actually, Hirotaka Takahashi, who is in charge of Identity and Access Management) consulted GakuNin (Academic Access Management Federation in Japan). GakuNin found this is the first such request from a research project (not from a university unit), and we had to wait until GakuNin changed their official rule, and it realized in the end of February.

The official monitors of the GW network, [gwstatus](#) (below right) and [gwistat](#), are now showing the real-time status of KAGRA (actually with 30 sec delay). An iOS & Android application of GW event list, [Chirp](#) is also showing the real-time status of KAGRA. All of them were implemented along to our requests, and somebody in LV kindly responded promptly.

Our announce of the starting day of the observation to LV colleagues was initially "from December". The schedule changed to "the end of January", then to "the end of February". Every Wednesday early morning, Kajita-san and I report the status of KAGRA at the LVK management call. Though we had to report the delay repeatedly, LV colleagues gave us always gentle, generous, and supportive reactions.

Up to now, we owe much in technical helps by LV colleagues. We appreciate on these helps honestly, and shall give back to them with our scientific contributions.

Hisaaki Shinkai 🍏



| | | | | |
|--|---|---|---|---|
| LIGO Hanford SCIENCE Duration: 0d 18:37:00 (prev. nohoff) Last updated at 2:19 | LIGO Livingston SCIENCE Duration: 1d 18:58:59 (prev. nohoff) Last updated at 2:19 | Virgo SCIENCE Duration: 0d 01:30:25 (prev. nohoff) Last updated at 2:19 | Kagra SCIENCE Duration: 0d 01:40:59 (prev. nohoff) Last updated at 2:19 | Sun Mar 01 2020 2:19:59 1267032017 |
| DMT 15 OK Last updated at 2:19 | Low-latency Data 46 OK Last updated at 2:19 | LIGO Data Replicator 14 OK Last updated at 2:19 | DetChar Summary 23 OK Last updated at 2:19 | DetChar Jobs 16 OK Last updated at 2:19 |
| GraceDB | LVAAlert | GraceDB | DQSegDB | NDS |

<https://monitor.ligo.org/gwstatus>
now shows the status of KAGRA also.

Collaboration

New Project Manager and new SEO

Shinji Miyoki
(from web)

Due to the retirement of Yoshio Saito (ICRR) from the project manager (PM) [see page 10], the executive office (EO) decided Shinji Miyoki (ICRR) for the next PM. Shinji organized new System Engineering Office (SEO) members as follows (alphabetical order):

Masaki Ando (U Tokyo)

Yoichi Aso (NAOJ)

Tomotada Akutsu (NAOJ)

Nobuhiro Kimura (KEK & ICRR)

Keiko Kokeyama (ICRR)

Osamu Miyakawa (ICRR)

Hideyuki Tagoshi (ICRR)

Takashi Uchiyama (ICRR)

The KSC newsletter asked Shinji for some comments, but could not receive any response. He might be tooo busy now.

LVK collaboration

Along to the works with LIGO/Virgo, we established two new groups. One is the committee of climate change: Luca Baiotti (Osaka U, Japan) and Quynh Lan Nguyen (U Notre Dame, USA). The other is the KAGRA-EPO (Education and Public Outreach) group: Heather Fong (RESCEU, Japan), Albert Kong (NTHU, Taiwan), Kwan Lok Li (NTHU, Taiwan), Wei-Tou Ni (WIPM, China), Quynh Lan Nguyen (U Nortre Dame, USA), Yoshihisa Obayashi (ICRR, Japan), Kuo-Chuan Pan (NTHU, Taiwan), Lijing Shao (Peking U, China), Hisaaki Shinkai (OIT, Japan), and Leo Tsukada (RESCEU, Japan). Both are consists from all self-nominated members.

The making the committee of climate change was upon a strong request from LV, and its tasks are introduced by Luca's article below. The KAGRA-EPO will coordinate the joint EPO works with LV, and also try to approach to public with original idea in coordination with the public relation team of ICRR. We know many of us are participating outreach events officially and/or personally. Heather gives us her wishes to make gravitational waves.

CCC LVK Committee on Climate Change

Luca Baiotti (Osaka U.)

In these days, the pandemic is what attracts all the attention, but in the longer-term future the issue and implications of climate change will probably be much more important for human society. After a spontaneous lunch-time discussion on this topic within a group of LSC members, Steve Fairhurst and Patrick Brady suggested to start a working group to evaluate LVK activities in light of climate change. Many scientific institutions already have working groups and declarations on the issue, including CERN, Fermilab, the American Astronomical Society, and the astronomy community in general (see, e.g., <https://arxiv.org/abs/1910.01272v1>).



As a first step a (yet informal) LVK Committee on Climate Change was created, with Daniel Holz as chair. The committee currently has more than ten members, including a few from Virgo and Quynh Lan Nguyen and myself for KAGRA. A request of formal recognition has been forwarded to the LVK leadership some time ago, but the official approval has not come yet, probably because of the many more urgent matters that are flooding us in this period.

The goal of our Committee on Climate Change is to examine the collaboration's carbon footprint and identify potential steps to mitigate our impact. We also hope to contribute to build awareness of this critical topic, both within and outside of the LVK collaboration. We have started gathering information mainly about 1) how much power our interferometer sites and our data-analysis computer systems use, 2) how much of the electricity we use is already produced in sustainable ways, 3) what has been the impact of construction of our interferometers, 4) how big is the environmental impact of travel to meetings specific to the whole collaboration or to the individual detectors.

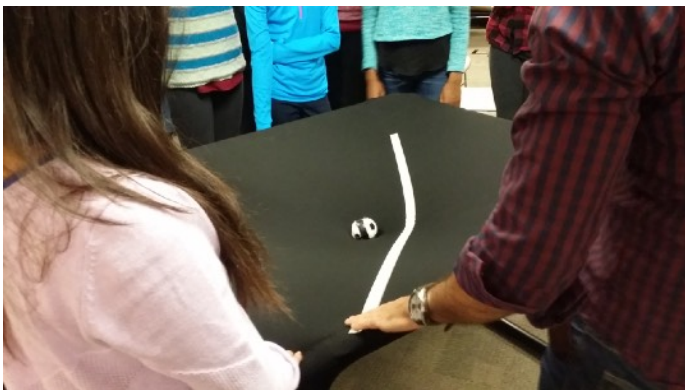
After analyzing our findings, we plan to come up with some recommendations to reduce the LVK collaboration impact on climate change. We will also propose a public statement to be put on our websites, declaring that the LIGO, Virgo, and KAGRA Collaborations acknowledge the scientific consensus regarding the existence of climate change, as well as the dangerous impact of greenhouse gas emissions from human activity. Hopefully the statement will continue with a list of action items we have implemented to mitigate our contribution to environmental problems. 🍏

EPO

What made you decide to study gravitational waves?

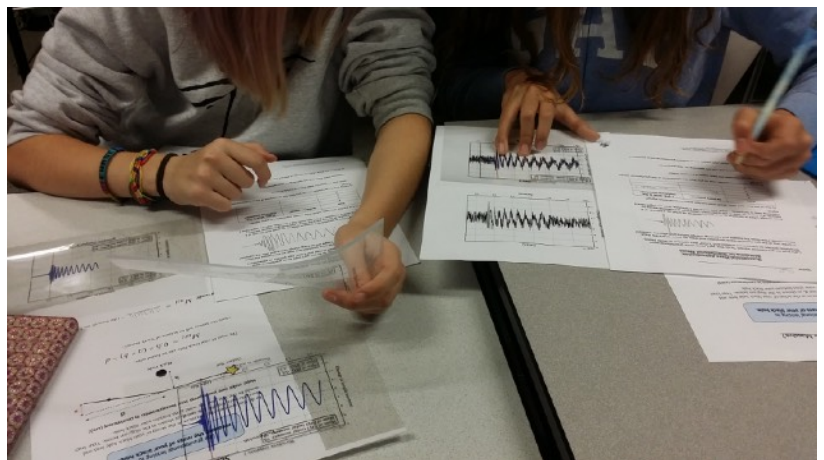
Heather Fong (RESCEU, U. Tokyo)

We all have an answer to that question, answers as varied and unique as we are to each other. But our answers probably stem from similar roots: opportunity and passion. Opportunity is how we got into the field in the first place, while passion is why we stay. In Education and Public Outreach, our goal is to engage the public by finding fun and creative avenues for them to engage with us and our research, and to share our excitement for gravitational waves, physics, and science.



There are many excellent ways to do outreach, and the aspect I am most passionate about is education. During graduate school, I worked closely with the outreach team at the University of Toronto's Dunlap Institute for Astronomy and Astrophysics with the focus of reaching out to educators. We learned that while educators are excited to introduce modern physics into their lesson plans, the time and effort required to present such concepts both creatively and accurately is often an overwhelming task. As a result, our goal was to create lab experiments that taught astrophysical phenomena such as black hole lensing and planetary transits, while also ensuring they could be easily recreated in a classroom and facilitated by the educators themselves. Our target audiences included elementary, junior, and high school students, where we focused not only the physics itself but also on critical thinking and peer collaboration. I also developed a few activities that were gravitational wave-specific, which have been well-received by educators and students.

It is my hope that through KAGRA EPO, we can continue to connect with the public, whether through social media, public talks, outreach events, or engaging them in classrooms. In particular, I look forward to bringing some of the activities that have been developed and improving them so they can also be made accessible by eager minds on this side of the globe. For me, outreach is creating a ripple in hopes that it will one day turn into waves - new physicists and science enthusiasts, who will continue to add to our understanding of the universe. 🍏



Pandemic COVID-19 in the world

Honestly speaking, when we celebrate the new year 2020, nobody could imagine of this world-wide new corona-virus COVID-19 pandemic. The tragedy was first reported as the lockdown of Wuhan China late January. The growth of the number of infected people (and death) are never stopping until now, and we already heard over a million people in the world have been infected. Almost all countries stop to move people between countries or even between cities. Almost all meetings are cancelled. Most universities stop to give lectures in person. We do not know when this situation ends. Our colleagues are kindly reporting the on-going situation each region.

China

In February, the situation in China was extremely bad. About 80,000 people was infected. Now the situation has become much better. Averagely, 30 infected people are reported. Usually all of them come from aboard.

Regarding to people's daily life, many factories have return usual working status. But most schools and universities are still closed. Only online teaching is going on.

For our researchers, we do study as usual. The only difference is working place changes to home and online discussions become much more popular and frequent. The KAGRA colleagues in China are closely following the development of KAGRA detector. We are happy to see the horizon for BNS is now about 1Mpc.

Zhoujian Cao 🍏 (April 4)

Taiwan

In Taiwan even though our life is as usual as past, to fight against COVID-19, several enforcements are applied inside the campus. First, everyone needs to have the body temperature measurement every day. Then, a sticker will be attached to those who have normal temperature; in case of abnormal temperature, the guy will be prohibited to enter the campus immediately and reported to the Campus Security Office. Before entering the classroom, office, or laboratory, you need to scan the QR-code as a registration. It is advised to wear a sanitary mask when taking the school bus. Let us win this battle soon.

Ray-Kuang Lee 🍏 (April 12)



Courtesy: NTHU website

Korea

April is the beginning of a flower blooming season in Korea. However, social distancing became a new normal and our work/life changed a lot this spring. Followed by cancelation of graduation ceremonies in late February, almost all student gatherings, academic events have been canceled or postponed. Dorms are closed. Campus is open with some restrictions. Not only students, but those affiliated in universities and research institutions are strongly encouraged to work from home whenever possible.

March was in particular hectic as public hygiene protocols and social distancing policy at universities had to be updated almost daily in order to cope with the national-wide situation. Since April, things seem to be slowly under control – at least in campus. Many pre-cautions have been in practice such as wearing a mask in campus, hand sanitizers at every corner in a building, and most recently, anti-virus films on elevator buttons !

An academic year at universities in Korea begins from the 1st of March, but this year, it has not begun until mid- or late-March. Moreover, all university lectures are given online. Ewha Womans University recently decided to make the 2020 Spring semester be completely online. Offline lectures/exams/practicum are to be refrained. Online lectures are challenging but doable. How to evaluate students is another challenge ahead of us. In fact, younger generations in Korea are accustomed to study online through the Korea Educational Broadcasting System since young age but many of them are not used to take exams online. It is curious if this pandemic would have some good impacts for higher education in Korea in the long run.

Not only educational institutions, academic organizations have difficulties to cope with the COVID-19 pandemic. Most academic events are canceled or postponed. The Korean Astronomical Society's Spring Meeting has been canceled and the 2020 Korean Physical Society Spring Meeting is postponed to July in the city of Changwon. I hope things will go back to normal soon and all can meet at KIW7!

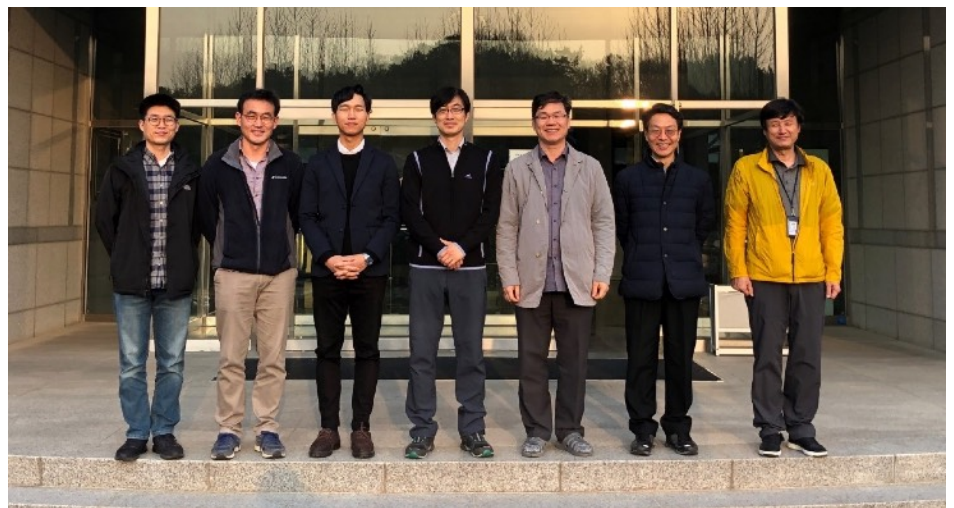
Chunglee Kim 🍏 (April 12)

Newly Joined GW experiment group at KASI

Sungho Lee

Greetings from the GW experiment group at Korea Astronomy and Space Science Institute (KASI), Korea. These days we always wear masks at work to protect each other, but it was excused for a second for this photo. One member of our group is working at home remotely to avoid risk of infection on the commuter train. We hope that the COVID-19 situation ends soon and we can start participating in the squeezing experiment at TAMA300 and other activities for KAGRA improvement. In the meanwhile, we have been building a squeezer at KASI with a goal to complete an initial setup in this year.

Photo taken on 7th, April, in front of Eun Ha Su hall which means the Galaxy hall. From left to right: Yunjong Kim, Chang-Hee Kim, Jinwha Gene, Sungho Lee, Jae Sok Oh, Jeong-Yeol Han, Hyeon Cheol Seong, and Ueejeong Jeong in the left box. Three members have newly joined since the last F2F meeting in Toyama; Ueejeong (electronics engineer) from this year, Jinwha (laser expert) and Jae Sok (optomechanical engineer) from this month.



Italy

#iorestoacasa (I stay at home) is the hashtag that summarizes the actions of the Italian government and the new lifestyle that Italians are living where everything that is not essential is closed and the days of rush are only a memory. Suspended in a sort of glass snowball, people found a new equilibrium. After one month of complete lockdown, people rediscovered the meaning of family, how to stay with children all day or how to stay alone, they understood how to organize their jobs at home (often with unexpected positive results) but more important they learnt what is essential for their life.

Never before people seek human contact, talk to each other, try to feel part of a community like now: very often Italians organize flash mobs on the balcony to sing a song all together or organize skype calls for a birthday or zoom calls for an online aperitif. People are cooking together rediscovering the slow gestures of tradition not only to prepare food but to reaffirm life.

Today is Easter, a religious holiday where people used to be together with their families but this year's leitmotiv is "we are far away today to be able to return to embrace tomorrow". This concept is reaffirmed by Catholic Church showing the Pope alone in San Pietro or concerts in empty churches broadcast online only.

In parallel there is an Italy that is working hard to aid in this situation. Doctors, nurses and medical staff risk their lives every day to fight the virus (more than 100 doctors died helping people). Alongside them, there are thousands of volunteers, civil protection and even fashion firms (Gucci, Prada, Bulgari) that have changed their production to manufacture masks, white coats, sanitizing gels or Ferrari and FCA who are producing respirators. Universities and schools are open but in remote, people are working a lot for keeping lectures and exams online with a strongly positive reaction from students... a strong signal for future generations: we keep going even in this dramatic situation.

To help, the best thing right now is to stay home. On this principle, EGO/Virgo site was closed: *"The O3b science ended Friday, March 27, 2020 at 5 PM UTC. From Tuesday 31st onwards the interferometer will be kept as much as possible in a standby state with the goal of being able to come back in operation as soon as external condition will allow for it and also to minimize the risk of damage"*. AdV+ upgrading activities are almost completely suspended because the companies that have to produce mechanical, electrical or optical parts are closed. In meanwhile, the organizational part is moving forward with more force than ever. The review of subtasks is taken advantage by all data collected up to the last day and reports on technical noises. Decisions are made week by week in order to follow the progress of the health situation.

Flavio Travasso 🍏 (April 14)

Spain

The Spanish government declared the state of emergency on March 15th and we have been staying home for a month. As you may know, hospitals went overcapacity here in Madrid and I read a lot of sad news related to it.

People are not allowed to walk outside for non-essential and non-urgent reasons. There are very few people in the streets and police are patrolling around to check on people and fine who violates the rule. The city looks empty as in some post-apocalyptic movie. I never

expected to see it for real.

All people stopped working except in hospitals, supermarkets, and pharmacies. Universities and research institutions are all closed. Researchers in my institute try to keep up research activities by organizing Zoom meetings, while personally, it's difficult to work at home with a small child as kindergartens are also all closed. The situation of being in quarantine is psychologically tough for both child and parents. But at the end of a long day, we join people coming out to balconies and give our applause for the doctors and nurses working in hospitals. My child learned to clap his hands and enjoys interacting with neighbors by waving his hand. I see people are enduring even in this difficult period.

The rumor says that the state of emergency will be extended at least until early May, while essential activities resumed today (April 13th). Probably it will take more for research activities to get back to normal. I hope everyone in the collaboration is safe. Please stay healthy and don't forget to cheer up yourself and your dearest!

Sachiko Kuroyanagi 🍏 (April 14)

USA

It has been a month since the coronavirus outbreak in the US and all the classes at most colleges has moved to distance learning in the middle of March. I came to University of Notre Dame campus the day after Easter holidays; the campus was unusually quiet, I can hear the whisper of the spring during the virus pandemic, our college lives are still going on. We are not able to go to the front-line as health workers, but we help in small ways. We work at home to reduce spreading the virus, yet keep our daily schedule the same. Remote class meeting times are the same as the in-person classes before Spring break. Academic activities, colloquia, “Astro-ph” meeting, informal lunches, pedagogy coffee discussions, research group meeting, are all done through Zoom, but they still go on. Those activities not only keeping us motivated during the “stay at home” period but also help us reaching out to each other to know that everyone still safe and stay well. At this moment, most research labs are suspended to be extra safe, however, students can defend still their thesis remotely as many students at the Department of Physics have completed their Ph.D. defense or Ph.D. candidacy exams. Atul Kedia, who is working with Prof. Grant Mathews on simulating binary neutron star mergers using the Einstein Toolkit code for to test different nuclear equations-of-state, completed the Ph.D. candidacy on April 6th. Atul had to give a half-hour talk on his research, as well as proposed research for the next few years. The talk is followed by questions and answers from the four professors on his committee. Given the COVID-19 concerns, his candidacy exam was done completely online. This type of research work is continuing almost normally as all codes of mergers are run on the Center for Research Computing machines at Notre Dame, which gives us easy remote access. I attended the program “Lighting new Lampposts for Dark Matter“ at Simons Center for Geometry and Physics in New York, where the coronavirus hit the hardest. I was there just before the outbreak and we practiced social distancing during our meetings and discussions to maintain safety for everyone. A week later, all in-person activities stopped due to the outbreak of the coronavirus. Despite the fear of the inviable virus and the sadness of those who suffered or passed away, for me, I am thankful to the ICRR’s Inter-University Research program. I am particularly thankful my daily life can happily continue; my son studies from home with me; and my puppy is so joyful when we stay home all day.

Quynh Lan Nguyen 🍏 (April 15)



Image: Notre Dame Golden Dome (taken by Quynh Lan on April 14, 2020)

JAPAN

Prime Minister Abe spent a month to change a law in February and March, and finally made a declaration of "Emergency Situation" on April 6 around Tokyo, Osaka, and Fukuoka. Governors of each prefecture closed all the public schools for a month and are suggesting people for refraining from going out. PM Abe also announced that the government will distribute two masks to each family on the April fool's day. It turned out not a joke, and people understand that the keyword of the Abe administration "Abenomics" (Abe+economics) for past 7 years has been changed to "Abenomask". Most of us (researchers) are staying home and keep discussion online.



Kamioka

Kamioka is one of the safest places in Japan. No infected person has been reported in Hida City as of April 17. However, as the University of Tokyo raised its activity restrictions¹ to level 3 (maximum restrictions) on April 8th and as the number of infected people in Toyama City, where many KAGRA onsite people are commuting from, are rapidly increasing from the beginning of April. In addition, the main road from Toyama city is blocked due to landslide and hard to access to Mozumi from Toyama city.

¹The University of Tokyo's activity restrictions index for preventing the spread of COVID-19 is found at <https://www.u-tokyo.ac.jp/content/400137605.pdf>

KAGRA

As we all received a message from PI on March 24 [kagra 03424], the KAGRA Observatory will follow the guideline of the Japanese government on COVID-19. Kajita-san wrote to us, "If we have even a single personnel, including a visitor, who is infected by COVID-19 in the KAGRA Observatory, the KAGRA Observatory and KAGRA itself will be closed immediately. The health of our colleagues is the top priority." KAGRA Observatory decided to apply almost the same restriction as the university's Tokyo and Kashiwa campuses from April 13th. We consider KAGRA's observation as one of "currently conducting long-term experiments that would experience a significant loss to their research if stopped," and hence we operate the observation with minimum researchers, technicians and administrative staffs living in Kamioka or Toyama. In addition, we require to wear a medical mask in the control room and wash hands frequently to prevent infection in the KAGRA Observatory from an asymptomatic infected person.

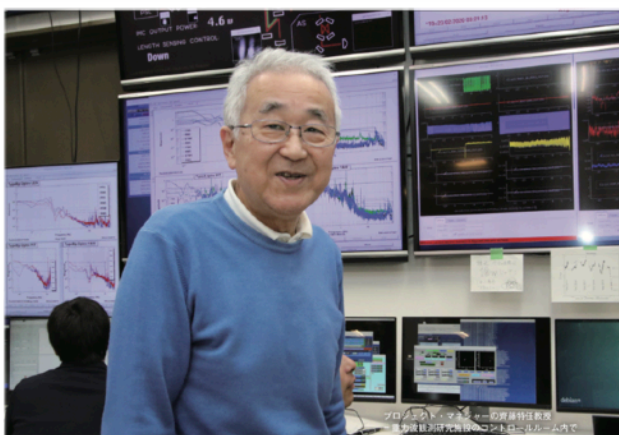
KAGRA is currently in operation. Under such situation, the collaborator-shift schedule was almost cancelled after mid March, and all shifts are taken only by local KAGRA colleagues. In addition, in the evening of April 16, Japanese government decided to declare the state of emergency for whole country, which suggests people not to make unnecessary movement until May 6. We once discussed a possibility of the extension of our observation period after April 21, but it will be quite unlikely to do so except some necessary calibration works.

Hisaaki Shinkai & Yoshihisa Obayashi 🍏 (April 17)

Retirement

Yoshio Saito, Project Manager for 7 years

Professor Yoshio Saito took the position of the project manager (PM) of KAGRA April 2013, when the construction of KAGRA tunnel was in the halfway. From April 2014, he became a permanent resident of Kamioka, and has been at the forefront of the KAGRA construction period, which began with the installation of the vacuum equipment. As PM for seven years, KAGRA has come to the place where gravitational wave observation can be performed with an observation range of almost 1 Mpc.



Features

Press Release 2020.2.25

**大型低温重力波望遠鏡 KAGRA
重力波観測のための連続運転を開始**
プロジェクト・マネージャーの
ICRR 重力波グループ 齊藤 芳男 特任教授に聞く

時空のさざ波である重力波の観測を目的に、岐阜県飛騨市神岡町に完成した大型低温重力波望遠鏡 KAGRA の本格運転が 2020 年 2 月 25 日午後 5 時、始まりました。完成式典が行われた 2019 年 10 月以降、感度を上げるためのチューニングを続けてきましたが、ようやく米国の LIGO、欧州の Virgo との共同観測が可能レベルまで近づき、重力波観測のための連続運転が開始されたことになります。2011 年に建設が始まってから 9 年、2013 年 4 月からはプロジェクト・マネージャーとして、KAGRA に関わり続けてきた齊藤芳男特任教授に、これまでの苦労や今後への期待について伺いました。

Latest [ICRR NEWS](#) featured KAGRA, and provides long interview of Prof. Yoshio Saito.

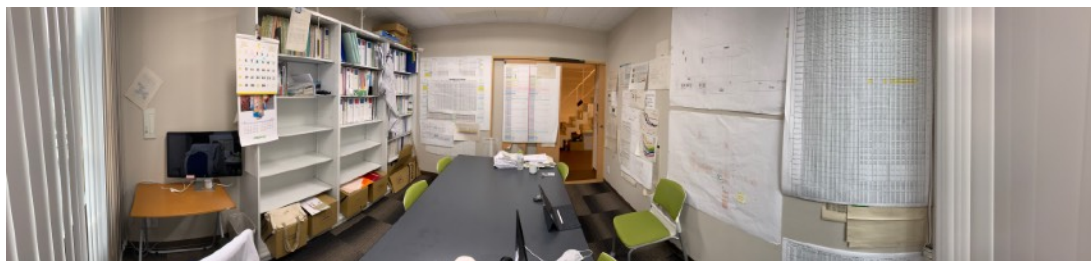
works in the analysis building at Mozumi. We are currently working on the design of the vacuum equipment, which is needed for seeing the surface of the beam splitter in a vacuum. I see every day he draws blueprints using graphing tools on graph paper. When the mess of the coronavirus has subsided, Prof. Saito will return to Tsukuba, then will continue to work at the ICRR Kashiwa as a member of KAGRA. KAGRA is still a developing project. I would like to keep asking Prof. Saito for advice based on his deep experience.

Prof. Saito underwent surgery twice while staying in Kamioka. In particular, the surgery in February 2018 was a big one. I went to visit the hospital and gave him a photobook of minerals and an idol group's yearbook. Professor Saito smiled after seeing what I chose, but I could feel his pain after the operation. After leaving the hospital, Prof. Saito gave me a gift in return. It was a great picture book that introduces the world's famous dishes that can be enjoyed with children.

What amazes me, Prof. Saito has wide range of knowledge and curiosity. Not to mention the specialized vacuum and physics, but also mathematics (with its history), chemistry, insects (he stuffed the wasps), world history, languages (French, Chinese, Korean), music (he played piano), cooking, photo, cycling, collection of picture books, and even the much knowledge of actresses and idols. He is also really familiar with Yakamochi Otomo (大伴家持), a

Japanese statesman and Waka poet in the Nara period. I heard he traveled along the path followed by Yakamochi Otomo in Toyama area. In this way, Prof. Saito was the walking encyclopedia and knowledge giant for me.

Prof. Saito retired from PM at the end of March 2020, but he is planning to stay in Kamioka for some time. Even now, he



Office of Prof. Saito. Many drawings on the board.

Professor Saito, Thank you for your hard work. We appreciate you for your long contributions.

Takashi Uchiyama 🍏

Previous F2F

The 24th Face-to-Face meeting at RESCEU, December 4-5, 2019

Program: <http://gwwiki.icrr.u-tokyo.ac.jp/JGWwiki/LCGT/Meeting/f2f/2019Dec>



The group of Research center of the Early Universe (RESCEU) Univ of Tokyo hosted our F2F. A day before, December 3, the data analysis groups organized a satellite meeting, where we discussed checking lists for joining O3. The December F2F meeting was for two days as always, and we had meeting dinner at the very standard drinking restaurant at Ueno. We had 110 participants, 6 doctoral thesis talks, 15 thesis related poster presentations. Poster awards were to Yutaro Enomoto and to Toshiya Yoshioka [see p. 12]. We thank Jun'ichi Yokoyama and RESCEU members for your kind hospitality. 🍏

Cancellation & Postponement

- * LVK meeting March 2020 was organized via telecon style.
- * Face-to-Face meeting April 2020 at ICRR Kashiwa was cancelled.
- * KIW7 at Taiwan in May 2020 was postponed to December 2020.

LIGO-Virgo collaboration (LVC) meeting was held in March and September every year, and the series had changed the name to LVK collaboration meeting from March 2020. However, due to the pandemic of COVID-19, the meeting was announced to be held in remote in early March. We now knew this was the right decision. People in the world are trying not to meet in person for avoiding infections. This situation is supposed to be kept for next months also.

In such situation, **we cancelled our Face-to-Face meeting April 2020** which was planned to be held at ICRR Kashiwa. (We instead will have telecon May 27 and 28.)



National Central University group (head: Yuki Inoue) in Taiwan announced once to host **the 7th KAGRA international workshop (KIW7)** at the end of May 2020. However, they postponed to hold it **in December, 2020**. The season is overlapped with December Face-to-Face, so that the board is planning to have F2F also at NCU the day before. NCU group plans to provide remote access. The board thanks the hosting groups of KIW8 (Sungho Lee, KASI, Korea) and KIW9 (Hong-bo Jim, NAO, China), for agreeing the related shift of the schedule.

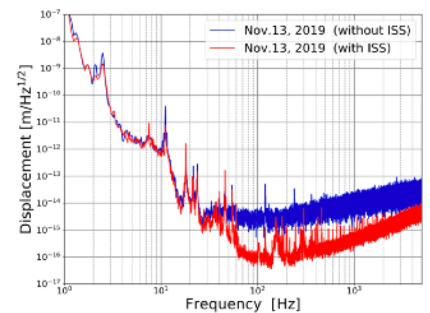
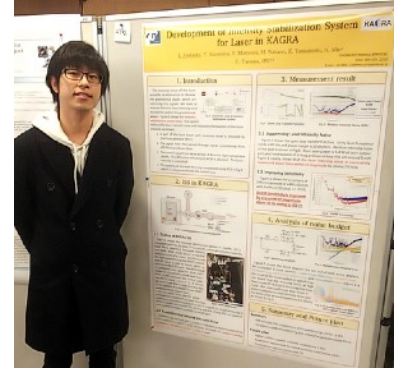
Poster Award

We awarded Toshiya Yoshioka and Yutaro Enomoto for their poster presentations at the 24th Face-to-Face meeting at RESCEU, U. Tokyo, December 2019. Congratulations! Here is the abstract of what they did.

Development of Intensity Stabilization System for Laser in KAGRA

Toshiya Yoshioka (Laser Phys. Lab., U. Toyama)

Reduction of the laser intensity noise would be crucial for the observation of the gravitational waves, which are extremely tiny signals. The laser intensity noise directly fluctuate the output signals and this cannot be distinguished from the original signal due to the gravitational signal. For high power laser, a random drift of the test mass caused by the radiation pressure of the intensity noise can be another indistinguishable noise. Therefore, we developed and installed the intensity stabilization system(ISS). This system is based on the feedback system using an acousto-optic modulator (AOM) as an actuator of the laser intensity modulation. In this system, the laser intensity noise can be reduced as follows: power of a part of the laser beam is monitored by a photo diode(PD). Then the output signal from the PD is compared with a DC stabilized reference voltage and the differential signal between them is feedbacked to an AOM placed upstream the laser beam. We designed the electric control circuit so that the response of the whole system should be stable, the unity gain frequency should be as high as possible and the phase margin should be greater than $\pi/6$. For the ISS installed in KAGRA, the AOM is placed near the exit of the main-laser output in the pre-stabilized laser room, the output beam transmits two mode cleaners: a premade cleaner and an input mode cleaner, and then a PD monitors the power of the laser beam transmitting the 1st input mode matching telescope mirror. Although the monitored noise level was unexpectedly as high as $10^{-4}/\sqrt{\text{Hz}}$, whose sources have not yet been understood, our system successfully reduced that by about 3 order of magnitude to below $10^{-7}/\sqrt{\text{Hz}}$ in the frequency range between 25Hz and 5kHz. As the results, the sensitivity of differential mode of arms (DARM) is improved by one and a half order of magnitude in the region above 60 Hz as shown in the Figure. 🍏

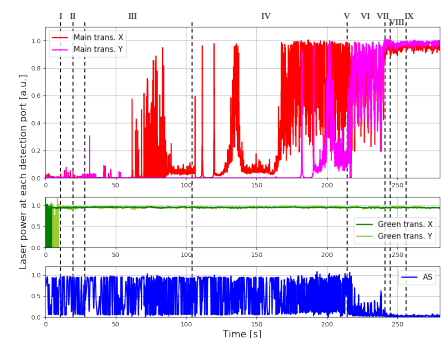
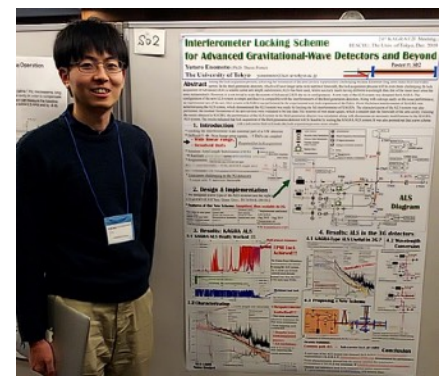


Interferometer Locking Scheme for Advanced Gravitational-Wave Detectors and Beyond

Yutaro Enomoto (U. Tokyo)

Among the lock acquisition process, achieving the resonances of the arm cavities is particularly challenging because kilometer-long arms make their linewidths narrow. In the third generation detectors, which will have longer arms with narrower linewidth, the lock acquisition process will be even more challenging. In lock acquisition of Advanced LIGO, a scheme called arm length stabilization (ALS) has been used, where auxiliary lasers having different wavelength than that of the main laser sense the arms independently. However, it is not trivial to scale up the system of Advanced LIGO due to its configuration.

In this study, a new type of the ALS system was designed and implemented in KAGRA; the system is designed to be compatible to the third generation detectors. The system satisfied the requirement of KAGRA so that lock acquisition of the Fabry-Perot Michelson interferometer of KAGRA was achieved with our system. The study also discussed potential issues and R&D items in applying the system in the third generation interferometer, proposing a new lock acquisition scheme with a sub-carrier field. 🍏



Poster Award

At the 29th JGRG workshop in Kobe University, November 2019, Mei Takeda was awarded one of the poster award. Congratulations!

Data Analysis of Gravitational Waves from the SASI mode in a core collapse supernova with the Hilbert-Huang Transform

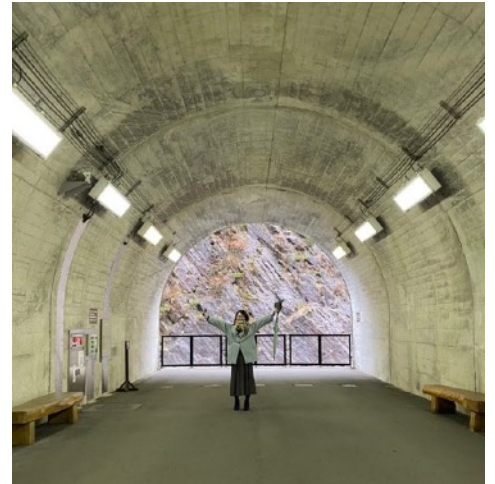
Mei Takeda (Niigata U. M2)

We have proposed the effectiveness of Hilbert-Huang Transform (HHT) for analyzing a GW from standing acceleration shock instability (SASI) in core-collapse supernovae (CCSN). The explosion mechanism of CCSN is unclear. However, some numerical simulations suggest that SASI might play a crucial role in it. It is important to investigate whether SASI actually occurs, and GWs could be a smoking-gun signature of the SASI.

For these analyses, a time-frequency analysis method is usually used, which determines the base waveform in advance and expresses the original signal by superimposing it. However, it is difficult for these methods to treat the frequency of the non-stationary signal as a function of time. The frequency of the SASI mode retains the internal information of the star before the explosion, and detailed analysis will lead to its understanding.

We turned our attention to HHT. HHT decomposes a signal as a superposition of intrinsic mode functions (IMFs) whose amplitude and phase change over time. Since the waveform of the IMF is determined adaptively to the signal, it includes the possibility of directly extracting the physical mode. In addition, the frequency is defined as the time derivative of the phase for each IMF.

As a result, we clearly extract the SASI mode from a simulated GW and statistically evaluate the frequency characteristics. As future work, we will analyze the signal superimposed on simulated and real detector noise.



PhD Thesis

The list of theses are available from our wiki,

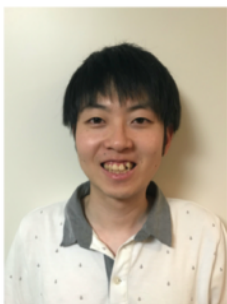
<http://gwwiki.icrr.u-tokyo.ac.jp/JGWwiki/KAGRA/Publications#PhD>

The KSC newsletter asked successfully defended persons to introduce their thesis here.

Dr. Enomoto is the first one to appear.

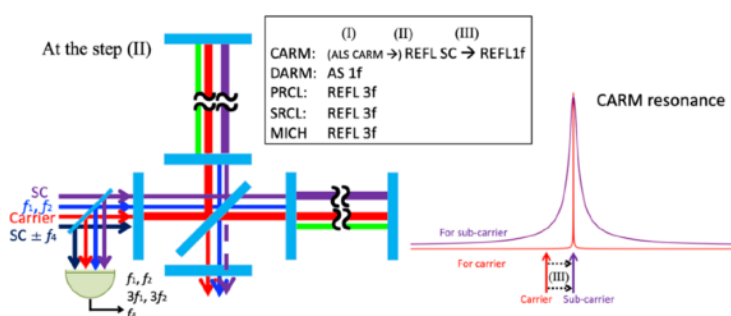
Interferometer Locking Scheme for Advanced Gravitational-Wave Detectors and Beyond

Yutaro Enomoto (U. Tokyo)



In this study, a new type of the ALS system (green-locking system) was designed and implemented in KAGRA; the system is designed to be compatible to the third generation detectors. The system satisfied the requirement of KAGRA so that lock acquisition of the Fabry-Perot Michelson interferometer of KAGRA was achieved with our system. The study also discussed potential issues and R&D items in applying the system in the third generation interferometer, proposing a new lock acquisition scheme with a sub-carrier field. Please also refer to the article on the Poster Award.

(Ph.D., The University of Tokyo, March 2020,
Supervisor: Masaki Ando)



WE HEAR THAT ...

Jun'ichi Yokoyama (RESCEU) received award from Minister of MEXT (see p.15)

Simon Zeidler moved from NAOJ to Rikkyo University as an assistant professor, April 2020.

Takafumi Ushiba moved from ICRR Kashiwa to ICRR Mozumi as an assistant professor, Feb. 2020.

Tatsuya Narikawa moved from Kyoto Univ to ICRR as a PD researcher, April 2020.

Nami Uchikata moved from Niigata Univ to ICRR as a PD researcher, April 2020.

Masayuki Nakano moved from University of Toyama to ICRR Mozumi as a PD researcher, April 2020.

Soichiro Morisaki graduated Univ Tokyo and moved to ICRR as a PD researcher, April 2020

Koseki Miyo graduated Univ Tokyo and became a PD researcher, April 2020

Yoshihisa Obayashi moved from ICRR Kashiwa to ICRR Mozumi, April 2020.

Shinya Funada moved from University of Toyama to ICRR Mozumi, as an assistant manager, April 2020.

Eri Sakamoto moved from NAOJ office to ICRR Mozumi office as a secretary, April 2020.

Congratulations! If you have other news, please notice them to the editors.

Yayoi Hara, ICRR Mozumi office, retired at the end of March 2020.

Yukari Maeda moved from ICRR Mozumi office to Super Kamiokande office, April 2020.

Koki Okutomi moved from ICRR Mozumi to a company in Tokyo, April 2020.

Ayako Ueda, KEK technical support staff, retired at the end of March 2020.

Kyoichi Takayama moved from ICRR Mozumi office to Univ Toyama office, April 2020.

We miss you. Thank you for your long contributions for the KAGRA collaboration.

NEW COLLABORATORS (*=NEW GROUP)

[December 2019 — April 10, 2020]

Academia Sinica

Feng-Kai Li (Research Assistant)

Cheng-Yi Chiang (Graduate Student)

Hsiang-Yu Huang (Graduate Student)

High Energy Accelerator Research Organization (KEK)

Shinichiro Michizono (Professor)

Hirota Nakai (Professor)

Norihiko Kamikubota (Professor)

Yasunori Tanimoto (Associate Professor)

Hirota Shimizu (Assistant Professor)

Korea Astronomy and Space Science Institute (KASI)

Ueejeong Jeong (Researcher)

Nagaoka University of Technology

Saki Kobayashi (Graduate Student)

Kohei Shiota (Graduate Student)

L. Malith M. De Silva (Graduate Student)

National Central University

Hong Lin Lin (Graduate Student)

National Taiwan Normal University

Jie-Shiun Tsao (Graduate Student)

Osaka City University

Mei Takeda (Graduate Student)

Rikkyo University, Experimental Group*

Simon Zeidler (Assistant Professor)

Shanghai Astronomical Observatory

Gang Wang (Assistant Professor)

Tamkang University

Hong-Yu Chou (Graduate Student)

Hui-Chih Huang (Graduate Student)

The Chinese University of Hong Kong

Tsz Lok Lam (Graduate Student)

The Institute of Physical and Chemical Research (RIKEN)

Shigehiro Nagataki (Chief Scientist)

Tetsuo Hatsuda (Program Director)

Yongjia Huang (Graduate Student)

The University of Tokyo, Institute for Cosmic Ray Research (ICRR), Kashiwa

Masaki Iwaya (Graduate Student)

Takumu Sugiyama (Graduate Student)

Ryouta Suzuki (Graduate Student)

The University of Tokyo, Institute for Cosmic Ray Research (ICRR), Mozumi

Shinya Funada (Assistant Manager)

Awarded

Minister of MEXT Award to Jun'ichi Yokoyama

On April 7, Ministry of Education, Culture, Sports, Science & Technology Japan (MEXT) announced the Minister Award^{1,2} this year. Among the 50 recipients of Research Section, Jun'ichi Yokoyama (RESCEU, Univ Tokyo) is listed together with his colleagues Masahide Yamaguchi (TITech) and Tsutomu Kobayashi (Rikkyo Univ) for the work on the most general model of inflationary universe.

Jun'ichi told us, "This is for the proposal of the Generalized G-inflation which is an inflationary universe model that includes practically all the single-field inflation model, but it is quite relevant to gravitational wave science, as our formula of tensor perturbation, in particular the expression of the speed of gravitational waves in modified gravity theories, has been used to constrain theories of gravitation using the observation of GW170817."

Congratulations!!

¹ https://www.mext.go.jp/b_menu/houdou/mext_00187.html

² <https://www.jps.or.jp/information/2020/04/reiwa2monka.php>



0 th

IT'S A GIRL !!

Hirotaka & Michiko Takahashi
had a baby girl on April 1.

They named her Sachie (咲智恵) .

CONGRATULATIONS !



60 th

On Feb 27, ICRR Mozumi group
celebrated Masatake Ohashi for
his 60th. **Congratulations!!**





In the book, "Physics 2020", an annual review of physics research for general, **Yuta Michimura** wrote an article on KAGRA.

Maruzen Publishing Co. (2020/Jan 24). ISBN: 978-4621304860, 2090 JPY.

Kagaku (Science) magazine from Iwanami Publishing Co. featured "Mystery of Black Holes and Gravitational Wave Astronomy" in their February 2020 issue.

From our colleagues, **Takaaki Kajita, Masatake Ohashi, Tomoya Kinugawa, Takahiro Tanaka, Kohei Inayoshi** contributed with each article. 1400 JPY.



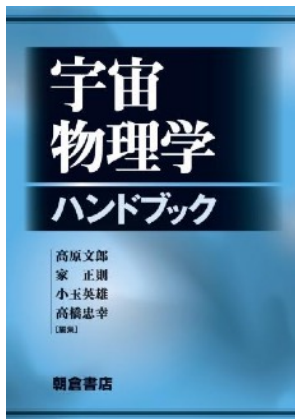
Takaaki Kajita has contributed not only an article on KAGRA but also a column entitled "Reconsider science policy in Japan which has reduced the number of students and papers from the field of education and research." (教育・研究の現場から学生と論文を減らしてきた「改革」を考え直せ)

Latest [ICRR NEWS](#) features KAGRA's observation run.



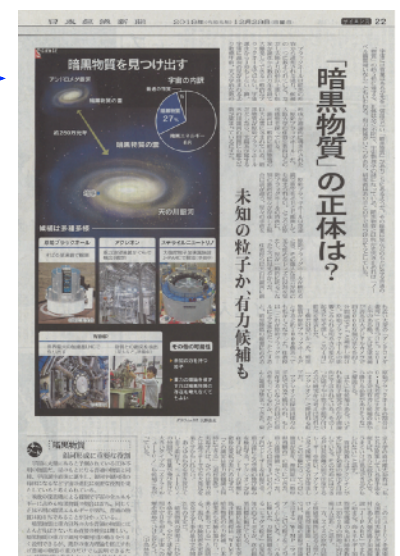
Handbook of Astrophysics, ed. by F. Takahara, M. Ie, H. Kodama and T. Takahashi (Asakura Publishing Co., 2020 Feb.), 912 pages, A5 size, ISBN978-4-254-13127-7, 22000 JPY.

We see contributions of **Nobuyuki Kanda, Kazunori Kohri, Hideyuki Tagoshi, and Jun'ichi Yokoyama**.



Yuta Michimura commented on his proposal of detection of dark matter using KAGRA in *Nikkei Newspaper*, December 20, 2019.

Hisaaki Shinkai commented on time machine in the section of cool science in *Nikkei Business* magazine (Mar 22, 2020). He also commented on KAGRA briefly how unexpected results may come to science.



Next chance of Face-to-Face

U. Toyama group booked the Kuroda hall August 20 (Thur.), 21 (Fri.), & 22 (Sat.) for our F2F meeting this summer. After that, many universities has changed the semester period due to COVID-19, and this schedule will overlap with the semester for many people, including of U Toyama, unexpectedly. The KSC board received requests to re-schedule the date, however it turned out that there is no alternative vacancy of the hall. Therefore, we keep the original schedule.

Please manage your schedule, and let's enjoy beautiful food in Toyama together again.

KAGRA MEETING SCHEDULE

Mark your calendar now for the following meetings.

KAGRA telecon alternative to Face-to-Face in April, **May 27 & 28, 2020.**

(alternative to F2F April. refer [the wiki page](#) for access information and schedule).

The 25th KAGRA Face-to-Face meeting at U. Toyama, **August 20-22, 2020.**

(see above article)

LIGO-Virgo-KAGRA collaboration meeting at Cardiff, UK, **September 14-17, 2020.**

The 26th KAGRA Face-to-Face meeting, at National Central U., Taiwan, **December 17 & 18, 2020.**

The 7th KAGRA International Workshop, at National Central U., Taiwan, **December 18-20, 2020.**

(see article in p.11)

LIGO-Virgo-KAGRA collaboration meeting at Lake Geneva, WI, USA (?), **March 22-26?, 2021.**

The 8th KAGRA International Workshop, at KASI, Daejeon, Korea, sometime **2021**

The 9th KAGRA International Workshop, at Beijing Normal U, China, sometime **2021**

RECENT KAGRA STATUS TALKS SEE [\[JGW-E1605649\]](#) FOR THE LIST.

| meeting/conferences | | speaker | JGWdoc |
|--|-----------|-----------------|--------------------------------|
| CRC Town Meeting at Osaka, Japan | Dec. 2019 | Takayuki Tomaru | [JGW-G1911136] |
| CRC Town Meeting at Osaka, Japan | Dec. 2019 | Sadakazu Haino | [JGW-G1910901] |
| the 32th Rironkon Symposium, NAOJ, Japan | Dec. 2019 | Yuta Michimura | [JGW-G1911123] |
| the 2nd Toyama international symposium on "Physics at the Cosmic Frontier" | Mar. 2020 | Matteo Leonardi | |
| the 3rd World Summit on Exploring the Dark Side of the Universe (remote) | Mar. 2020 | Keiko Kokeyama | |
| LVK 2020 March meeting (telecon) | Mar. 2020 | Hisaaki Shinkai | [JGW-G1911158] |
| JPS meeting, Nagoya, Japan (slide only) | Mar. 2020 | Masayuki Nakano | |

KAGRA COLLABORATION ARTICLES

Prospects for Observing and Localizing Gravitational-Wave Transients with Advanced LIGO, Advanced Virgo and KAGRA (aka. scenario paper)

Abbott, B. P. et al. (KAGRA Collaboration, LIGO Scientific Collaboration, and Virgo Collaboration)
[arXiv:1304.0670] <https://arxiv.org/abs/1304.0670> updated Jan 14, 2020

Application of the independent component analysis to the iKAGRA data

KAGRA collaboration (Author List 2015 + 2018)

accepted for publication in PTEP (2020)

[arXiv:1908.03013] <https://arxiv.org/abs/1908.3013>

Overview of KAGRA : KAGRA science

KAGRA collaboration (Author List 2018 + alpha + 2019 if ready) [JGW-P2011478]

submitted to PTEP

Overview of KAGRA : Detector design and construction history

KAGRA collaboration (Author List 2018 + 2019 if ready) [JGW-P2011614]

will be submitted to PTEP after the internal review is over

Collaborator-list managers made their mailing address kagraros@icrr.u-tokyo.ac.jp; ros from a roster.

If your affiliation address (or email) changes: Contact to kagraros@icrr.u-tokyo.ac.jp

If your group has new members: Contact to kagraros@icrr.u-tokyo.ac.jp

If you have a nice photo: Let the KSC Newsletter share them.

If your neighbor is planning to join KAGRA collaboration: Please suggest to check out our wiki FAQ

<http://gwwiki.icrr.u-tokyo.ac.jp/JGWwiki/KAGRA/KSC/FAQ>

FROM EDITORS

We appreciate many contributors again for this issue.

We are always calling editorial volunteers, and we also want your posts and/or leaks of information.

Please send your inquiries the current editorial staff.

Hisaaki Shinkai (OIT) hisaaki.shinkai@oit.ac.jp

Ayaka Shoda (NAOJ) ayaka.shoda@nao.ac.jp

Yoshihisa Obayashi (ICRR) ooba@icrr.u-tokyo.ac.jp

Kentaro Komori (MIT) kentarok@mit.edu

Quynh Lan Nguyen (UND) nguyen3@nd.edu



With the faith and hope that Virgin Mary always with us
and bless us to overcome the coronavirus pandemic.

KSC Newsletter backnumbers

this issue [JGW-L1911619]

<https://gwdoc.icrr.u-tokyo.ac.jp/cgi-bin/DocDB/ShowDocument?docid=11619>

No. 6 (2019/12) [JGW-L1911020] <https://gwdoc.icrr.u-tokyo.ac.jp/cgi-bin/DocDB/ShowDocument?docid=11020>

No. 5 (2019/8) [JGW-L1910543] <https://gwdoc.icrr.u-tokyo.ac.jp/cgi-bin/DocDB/ShowDocument?docid=10543>

No. 4 (2019/4) [JGW-L1910057] <https://gwdoc.icrr.u-tokyo.ac.jp/cgi-bin/DocDB/ShowDocument?docid=10057>

No. 3 (2018/12) [JGW-M1809350] <https://gwdoc.icrr.u-tokyo.ac.jp/cgi-bin/DocDB/ShowDocument?docid=9350>

No. 2 (2018/8) [JGW-L1808559] <https://gwdoc.icrr.u-tokyo.ac.jp/cgi-bin/DocDB/ShowDocument?docid=8559>

No. 1 (2018/4) [JGW-L1808122] <https://gwdoc.icrr.u-tokyo.ac.jp/cgi-bin/DocDB/ShowDocument?docid=8122>