KAGRA SCIENTIFIC CONGRESS: COLLABORATORS' INFORMATION EXCHANGE 2018/08/01

KSC Newsletter

Second Issue

From Phase 1 to Phase 2

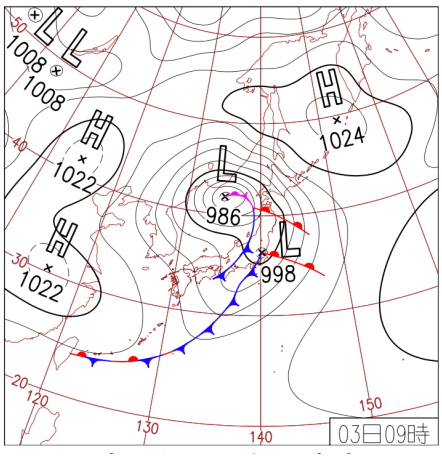
Nine-day operation with wild weather & earthquakes

KAGRA now has the world's tallest vibration isolation systems (13.5 m) which help to reduce seismic noise at low frequencies. The volume of the vacuum system is third largest in the world. Two 23-kg sapphire mirrors have been installed at each end, and one of them was kept for 30 days at cryogenic temperature (18K).

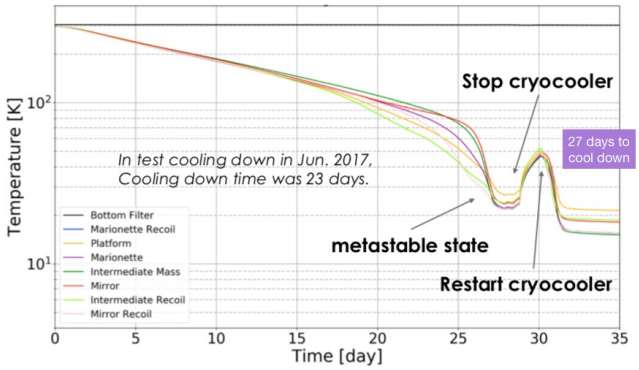
A leakage of the vacuum system was found in April 2018, therefore the Phase-1 experimental activity was delayed for 5 days. Despite the difficulties, the phase-1 operation was a success: it lasted from April 28 to May 6, 2018, and during this period many injection tests were performed.

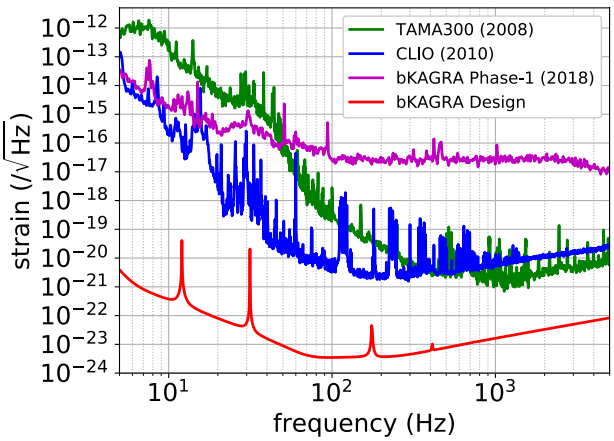
The interferometer duty cycle during the Phase-1 operation reached 88.6% between April 28 and May 2, while it dropped to 26.8% on May 3 and 4. Finally it slightly improved to 59.8% over the final days (May 5 & 6). The longest lock was over 10 hours. The low duty cycle on May 3 and on the following days was mainly attributed to the high micro-seismic noise caused by a heavy storm, local earthquakes, volcano eruptions in Hawaii, and visits of theorists.

The achieved sensitivity during Phase 1 was still worse than the final sensitivities of TAMA and CLIO, except at the lower frequencies (40 Hz), where KAGRA's sensitivity was better than that of TAMA. KAGRA started Phase 2 from May 7: the final installation work before the real observation run.



Weather map of May 3, 2018.





Contents of this issue

p-2 Directions
Steps to the Observation 2019
p-3 Kamioka local
Subgroup orientation
Kagra River / Science Cafe
p-5 Meetings
F2F at Osaka City U.
KIW5 at Seoul
Poster Award Winners
Group LOGO
Next F2F at Toyama
p-8 Virgo Visit
p-9 We hear that ...

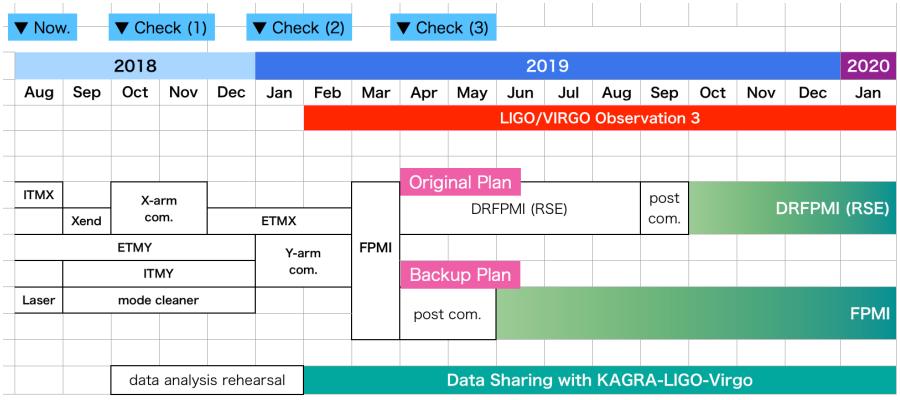
Directions

Steps to the 2019 observation

Beginning of the observation run from the Summer or Autumn, 2019: keep two plans in mind

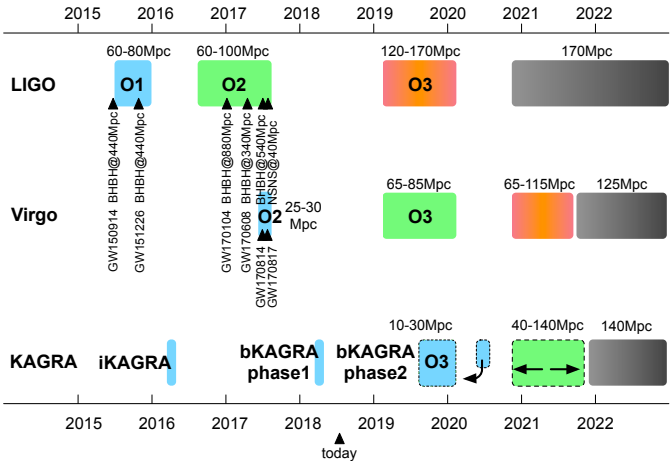
Due to the delay of the memorandum of understandings (MOU) update between LIGO and Virgo, the official discussion of joint collaborations has not yet started between KAGRA and LIGO/Virgo. However, many preparations are in progress inside KAGRA and between researchers with LIGO/Virgo.

During the face-to-face meeting at Osaka City Univ. May 2018, we agreed on the update plan towards O3 (observational run 3, starts February 2019). We decided to keep the original plan of DRFPMI (RSE)* and the backup plan of FPMI, and dropped the other backup plan of PRFPMI* after the long discussion of total cost, available schedule, experience, etc. We also set three checkpoints at the end of September, December 2018 and March 2019. If there are serious delays or troubles that will prevent us from reaching the RSE configuration, then we will shift to the backup plan (FPMI) for O3. If the chosen configuration will be FPMI, the installation work will be finished in May and the observation period (~10 Mpc with neutron star binary range) will start sometime in summer 2019. If RSE configuration, then the interferometer will be ready in August and we will start the observation period (~30 Mpc) in October, hopefully.



Steps toward O3. We have two plans: RSE or FPMI. We anyway will join the observation no later than October 2019.

At the end of July, the program advisory board (PAB) meeting was held at Kashiwa, Tokyo. PAB (Chair: Albert Lazzarini) reviewed our plans and status in detail, and encouraged us towards O3.



Revised KAGRA plan. After O3, we will try to join O4 from the beginning.

Data Analysis/Data Management groups are getting ready to begin the co-analysis of O3 data from the beginning of it (February 2019), and they already started tests of data sharing with the LIGO group from June. These two groups plan to re-organize the Kagra subgroup structures to directly match the data-analysis groups structure existing in LIGO/Virgo. (See [JGWdoc 8488] for details). This reorganization will be discussed at the satellite meeting of the next face-to-face at Toyama. If you have an original research plan(s), this will be a good chance to join to data analysis activities.

Recently, the Executive Office (EO) proposed a plan for the period after O3. We do not know what the budget status will be after 2019, but our statement to the GW community is that we will try to participate in O4 from the beginning till the end.

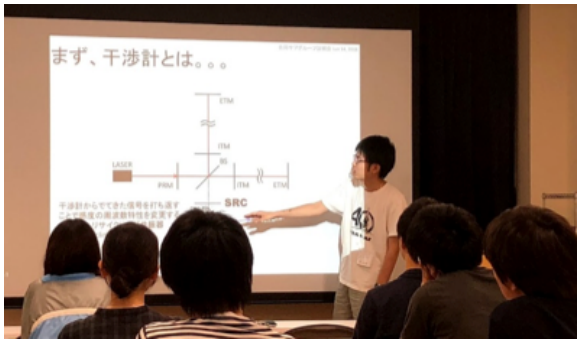
Hisaaki Shinkai

DRFPMI (RSE) = dual-recycled Fabry-Perot-Michelson interferometer (resonant sideband extraction)
PRFPMI = power recycled Fabry-Perot-Michelson interferometer

Kamioka Local

Subgroup orientation for young collaborators

Kamioka life and jargon (IOO, VIS, etc) were explained in advance of BBQ





We held a KAGRA introduction seminar at Kamioka on June 14th. This meeting was organized by senior students since last year. We introduced what we are doing in each subgroups to newly joined students, (i.e., undergraduate students and students in 1st year of graduate schools).

After a welcome speech from Prof. Ohashi, the activities in each subgroup, such as IOO, VIS, etc, were introduced. Some students explained as well how life in Kamioka goes, and how we can contribute to KAGRA from offsite. After the seminar, we also had a KAGRA site tour, that terminated BBQ party with Hida beef ☺

It was a good chance to know about the life in the research field as well as KAGRA's research topics. We hope that this seminar helped students to get involved in KAGRA in a better way. We are looking forward doing a fun research with you!

Satoshi Tanioka (translated by Ayaka Shoda) 🍏

Kagra River

Super-heavy rain continued for several days in early July in west Japan —- and Kamioka tunnel river appears!!



@Y-arm July 10, photo by Kyoichi Takayama



@YNO.104 July 10 19:58, photo by Kiyoshi Furuta



Public Outreach

Science Café in Gifu

On Saturday, July 14, Dr. Osamu Miyakawa gave a Science Café talk with title, "KAGRA, to answer the 100-year-long homework assignment from Einstein ~A new challenge in Kamioka~", at the headquarters of Gifu Shimbun, a local newspaper company in Gifu prefecture.

Kamioka Observatory, which hosts Super-Kamiokande, and Gifu Shimbun started the series of "Science Café in Gifu" six years ago at Kamioka. For the first time a KAGRA researcher was invited to give a talk at the Cafe.

Miyakawa-san explained how a gravitational waves are generated, how we can detect them, the mechanism of the KAGRA detector, how hard it was to construct the tunnel and the detector, and many other things. About half of the audience was formed by high-school students, so, Miyakawa-san told them his personal story on how he became a researcher and what is important to becoming a researcher.





In the Q&A sessions, audiences asked a lot of keen questions about gravitational waves, theory of relativity, and more. Miyakawa-san answered all the questions quite thoughtfully.

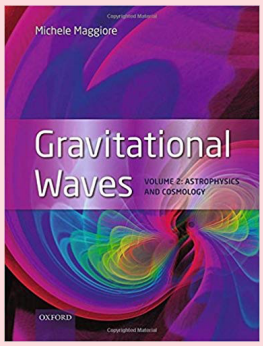
On the hottest day in Gifu (outside temperature was 39 degree Celsius!), even though the inside of the building was well air-conditioned, the discussion was also hot and all the people felt the two hours flew by very fast; the time is not an absolute scale!

Yoshihisa Obayashi

KAGRA SITE VISITORS

June 22: Tokyo Univ EMP club, 27 students
June 29: Hida houjin kai, 15 persons
July 10: Nakabo Tech Co.Ltd, 5 persons
July 12: (Gifu) Yoshiki high school, 22 students
July 13: Mitsui Sumitomo Trust Bank, 8 persons
July 18: Keio Fujisawa high school, 27 students
July 26: Toyama high school, 33 students
July 27: Momoyama high school, 21 students
July 27: Kindai-Wakayama high school, 25 students
(Note: this list is not completed)

New Book on GW physics



Gravitational Waves: Volume 2: Astrophysics and Cosmology
Michele Maggiore

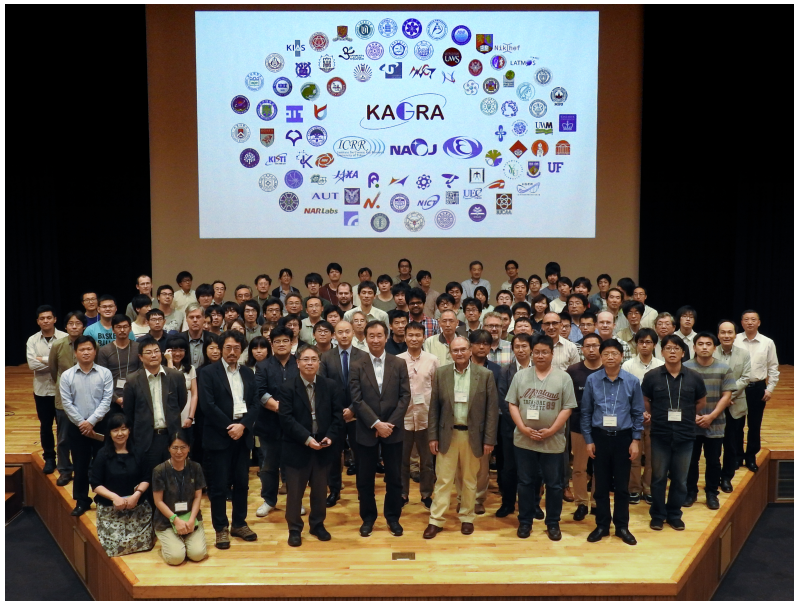
Oxford Univ. Press (May 2018)
ISBN-13: 978-0198570899
848 pages, 2020 g,
$75 (Amazon)

Recent Meetings

The 19th Face-to-Face meeting at Osaka City Univ. May 18-20

Program: http://gwwiki.icrr.u-tokyo.ac.jp/JGWwiki/LCGT/Meeting/f2f/2018May

We discussed the results of Phase-1 operation, roadmap to O3, and other urgent issues. There were 103 participants, including 20 people from overseas. Seventy-eight attended the banquet during the first evening.



Invited talk: Albert Lazzarini (Caltech)
Two new institutes joined:
WIMP (Wuhan Institute of Physics and Mathematics), IOO & VIS groups
WHIGG (Wuhan Institute of Geodesy and Geophysics), GIS group

For the first time, the Poster Presentation Prize was held.

We thank LOCs, Nobuyuki Kanda, Yousuke Itoh, Ms. Mieko Katsumura, and OCU members.

The 4th KAGRA International Workshop at Ewha Womans Univ., Seoul, Korea, June 29-30

Program: http://yangjs.inje.ac.kr/Symposium/kiw/

We had KAGRA, LIGO, Virgo status talks; GW science talks; multi-messenger astronomy and future detectors talks, and so on. We also had an invited talk on the community diversity. There were 78 participants, including 25 people from Korea.
We thank SOCs (chair: Hyung-Mok Lee), LOCs (chair: Chunglee Kim), and the Korean GW group.

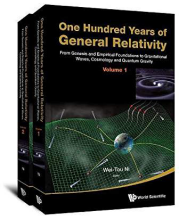


Poster Award Winners

Initial award for students' poster presentation

In respond to the request of the "young researchers" group, for the first time we awarded poster presentations given by students at the recent face-to-face meeting at the Osaka City University. All participants were asked to vote and Prof. Wei-Tou Ni kindly donated two sets of his newly edited books as the winner's prize. KAGRA's first poster award was given to Mr. Kouseki Miyo and Mr. Akinobu Miyamoto together with a certification signed by our Takaaki Kajita!

Here are the abstracts of the winner's presentations.

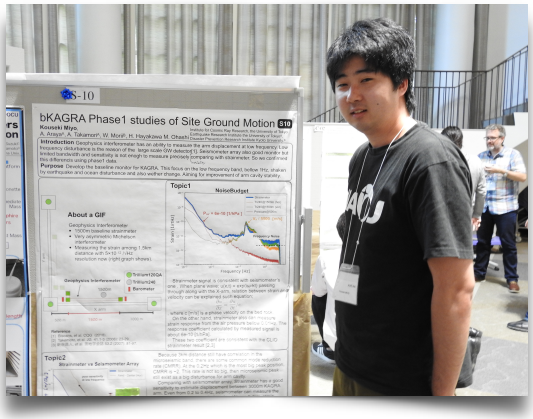


One Hundred Years of General Relativity: From Genesis and Empirical Foundations to Gravitational Waves, Cosmology an…
Wei-tou Ni
ハードカバー
￥ 29,524

"Fruitful Contents" Section

Kouseki Miyo (ICRR, The Univ. of Tokyo)

bKAGRA phase1 studies of Site Ground Motion



We report that a strain-meter can do broader measurement of slow drift of arm length in terms of frequency than a seismometer. A seismometer cannot measure seismic noise in a few tens of mHz due to storms and earthquakes (that is why there were some lock-losses in LIGO), because the seismometer cannot distinguish slope of its housing from arm length change.

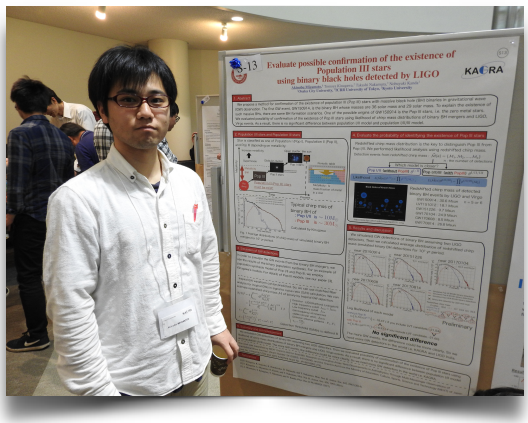
First, some parameters related to noise sources for the strain-meter were estimated. The phase velocity of elastic wave propagating through the KAGRA mine was estimated to be 5500 [m/s], which is the same as for P-waves calculated from CLIO data. We also got a response coefficient of 6e-10 [1/Pa] from air pressure to strain, which is also consistent with CLIO data.

Second, we compare the noise level of the strain-meter with that of the seismometer. The sensitivity of the strain-meter was estimated by dividing the displacement by 3000 m. The one of the seismometer was obtained by integrating the measured velocity to get the displacement and by calculating the difference of these at the center area and at X-end. As a result, the sensitivity of the strain-meter was found to be better than that of the seismometer at low frequency. (translated by Kentaro Komori)

"Beautiful Presentation" Section

Akinobu Miyamoto (Osaka City Univ.)

Evaluate possible confirmation of the existence of Population III stars using binary black holes detected by LIGO



We proposed a method for confirmation of the existence of population III (Pop III) stars with massive black hole (BH) binaries in gravitational wave (GW) observation. The first GW event, GW150914, was a the binary BH whose masses are 36 and 29 solar masses. To explain the existence of such massive BHs, there are some BH formation scenarios. One of the possible origins of GW150914 is the Pop III stars, i.e. the zero metal stars.

We simulated GW detections of binary BHs assuming two LIGO detectors. Then we evaluated the possibility of confirmation of the existence of Pop III stars using likelihood distribution of chirp mass of binary BH mergers and detected events by LIGO and Virgo (five events and a candidate).

As a result, with and without the Pop III model, the likelihoods are very close. There is no significant difference between with Pop III model and without the Pop III model. However, with more GW events, the difference could be more clear. So, we need higher sensitivity and more detectors such as KAGRA, LIGO India, and the third generation GW detectors.

(photos by Marika Sasai)

Next Meeting

Face-to-Face at Toyama Univ., August 24-26

Satellite meeting on data analysis/data management groups on Aug. 23

As usually in August, we will meet us at Toyama. LOCs (Yoshiki Moriwaki, Kazuhiro Yamamoto, and Kyoichi Takayama) applied for some support from Toyama City. If they are successful, we may have a free meeting-dinner again! So please do not forget to make your registration before August 7.

On the day before the meeting starts, data analysis & data management groups will organize a satellite meeting, where they will discuss their re-organization plans. KSC board planned to have a site tour after the F2F, and fully booked for one car-ride already.

GROUP LOGO IS READY

At the face-to-face meeting in Osaka, Yoshihisa Obayashi (KAGRA public relation) announced that the list of logos of the KAGRA collaboration is ready. It includes logos 90 institutes and universities. Unfortunately, due to license problems, we cannot make T-shirts, mugs, or jigsaw puzzles using this picture. But you can use it in your presentations, or an advertisement of your efforts, if it helps.



The file is available from
https://gwdoc.icrr.u-tokyo.ac.jp/cgi-bin/private/DocDB/ShowDocument?docid=8301

KAGRA MEETING SCHEDULE

Mark your calendar now for the following meetings.

The 20th KAGRA Face-to-Face meeting at Toyama Univ., **Aug. 24 (Fri) – 26 (Sun), 2018**
Satellite meeting on data analysis/data managing groups, **Aug.23**

The 21st KAGRA Face-to-Face meeting at National Astronomical Observatory in Japan, Tokyo,
December 5 (Wed) - 6 (Thur), 2018

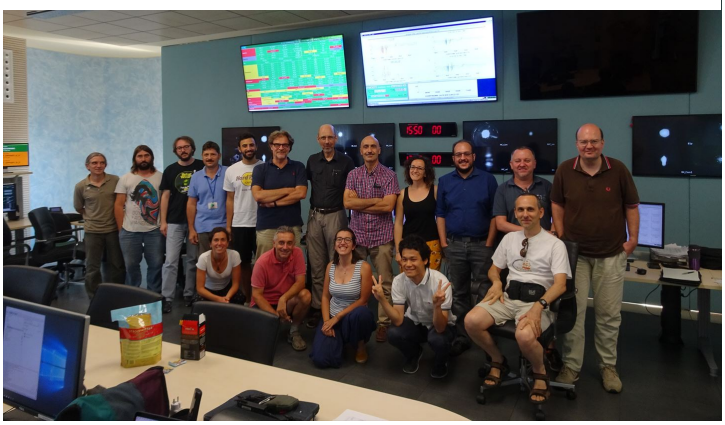
The 5th KAGRA International Workshop, at Perugia, Italy, **Feb. 14 (Thur) – 16 (Sat), 2019**
The 22nd KAGRA Face-to-Face meeting at somewhere and someday in **March or May.**
[We call for the host university/institute.]
The 6th KAGRA International Workshop, at Wuhan, China, **June 21 (Fri) - 23 (Sun), 2019 [updated]**
The 7th KAGRA International Workshop, in Taiwan, **March, 2020 [updated]**

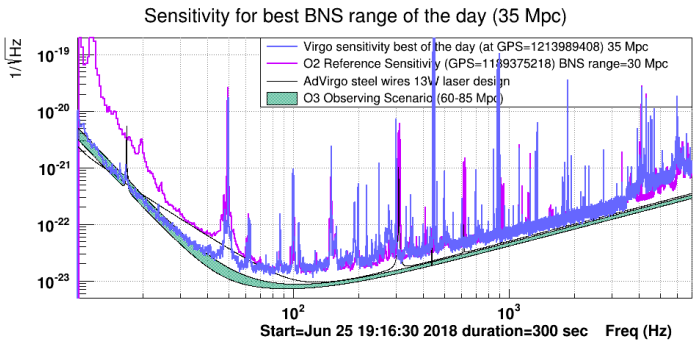
Site Report

Advanced Virgo: the best summer destination for commissioners

Yuta Michimura

I am now visiting Virgo site for 2 months from June 5. Advanced Virgo commissioning is now in a critical phase to reach the O3 sensitivity goal of 60-85 Mpc in the binary neutron star (BNS) range. The installation of a full monolithic suspension was done in March, and on June 25 we reached the best best BNS range up to now of 35 Mpc. The sensitivity improvement is mainly due to frequency noise subtraction at high frequencies and a tuning of the suspension controls. Amazingly, the sensitivity below 40 Hz is already compliant with the O3 goal! On June 26, we doubled the input power from 13 W to 25 W, to reduce shot noise at high frequencies. After the power increase, we were suffering from new issues. On July 23, we finally recovered the full lock of the interferometer, but the sensitivity is still at around 15 Mpc. Work towards more stable locking and investigations on some new noise sources is ongoing with great efforts.





The best sensitivity was achieved on June 25 (plot from Virgo Interferometer Monitor, VIM).



Virgo site has a superb canteen, which offers a different menu every day. Buonissimo!



Beautiful sunflowers along the west arm.

I have been to LIGO for several times, but this is my first visit to Virgo. The working environment at Virgo is very nice: friendly people, beautiful weather, excellent facilities, and delicious food. I realized that working environment is crucial for physics research. Interferometer commissioning is fun, but it can be even more fun with a better environment.

From my perspective, the KAGRA collaboration resembles more to Virgo than LIGO in which subgroups are led by different institutes. Virgo is suffering from the lack of manpower especially for the interferometer commissioning at the site, and therefore participation of remote people is very active compared with KAGRA and LIGO. I think many issues Virgo is now facing will be our own issues in the near future. I hope my experience from the Virgo visit will be useful not only for KAGRA commissioning, but also for a better collaboration in KAGRA.

This visit is supported by the Young Researchers International Deployment Program at the University of Tokyo. Visiting abroad for this long period not be possible without this program and the support from my colleagues in the Ando group and KAGRA. Thank you very much.

WE HEAR THAT . . .

Misao Sasaki moved from YITP (Kyoto Univ.) to IPMU (Univ. Tokyo) as the Deputy Director, April 2018.

Norikatsu Mio moved from Photon Science Center (Univ. Tokyo) to Institute for Photon Science and Technology (Univ. Tokyo) as a professor, October 2017.

Yuki Inoue moved from Academia Sinica to National Central University as an assistant professor, August 2018.

Matteo Leonardi moved from GEO600 (AEI - Hannover) to NAOJ as an assistant professor, October 2017.

Takahiro Sawada moved from University of Michigan to Osaka City University as a specially-appointed lecturer, April 2018.

Nguyen Quynh Lan moved from Hanoi National University of Education to the University of Notre Dame as an adjunct associate professor.

Lucia Trozzo moved from University of Siena to ICRR as a PostDoc, July 2018.

Shota Shibagaki moved from NAOJ to Fukuoka Univ. as a PostDoc, April 2018.

Chihiro Kozakai moved from Univ. Tokyo to KEK as a PostDoc, April 2018.

Darkhan Tuyenbayev moved to Academia Sinica as a PostDoc.

Fabián Peña Arellano moved from NAOJ to ICRR as a PostDoc, April 2018.

Ippei Obata moved from Kyoto Univ. to ICRR as a PostDoc, April 2018.

Congratulations! If you have other news, please let the editors know.

New Groups in KAGRA Collaboration

Two groups joined KAGRA collaborations.

Wuhan Institute of Physics and Mathematics, Chinese Academy of Sciences. [IOO/VIS group]

Mingsheng Zhan (Researcher)
Jing Wang (Researcher)
Dongfeng Gao (Researcher)
Panwei Huang (D2)
Guiguo Ge (M2)

Institute of Geodesy and Geophysics, Chinese Academy of Sciences [GIF group]

Haoming Yan (Professor)
Xiangfang Zeng (Professor)
Min Zhong (Professor)
Wei Tian (Associate Professor)
Jiangcun Zhou (Associate Professor)
Weiming Zhang (Chief Engineer)

If you moved to a new place within the KAGRA collaboration: Contact to the KSC board. You will be requested to make a short introduction at the face-to-face meeting.
If you want to join KAGRA collaboration independently: Contact to the KSC board. You are required to have a public interview at the face-to-face meeting.

New Collaborators

Academia Sinica
- Yun-Jing Huang (M1)
- Darkhan Tuyenbayev (PD)

Fukuoka University
- Yurie Sakuno (M1)

Hiroshima University
- Yuto Kimura (M1)

Hosei University
- Yasuka Hashimoto (M1)

Korea Institute of Science and Technology Information
- Sangwook Bae (Senior Researcher)

Nagaoka University of Technology
- Gen Ueshima (B4)

National Astronomical Observatory of Japan
- Risa Shimizu (Engineer)

Niigata University
- Kazuhiro Matsuzaki (M1)
- Ryo Negishi (M1)
- Issei Sugai (M1)
- Mei Takeda (M1)

Osaka City University
- Yuki Tomigami (M1)

The Chinese University of Hong Kong
- Terrence Tak Lun Tsang (Grad student)

The Graduate University for Advanced Studies
- Rishabh Bajpai (M1)

The University of Tokyo, Dept. Physics
- Naoki Kita (M1)

The University of Tokyo, ICRR
- Yuzuru Yoshii (Project Prof.)
- Wataru Ogaki (M1)
- Kenta Tanaka (M1)
- Taiki Tanaka (M1)

The University of Tokyo, Institute for Photon Science and Technology
- Hiroyuki Tahara (M2)

The University of Tokyo, RESCEU
- Hiroaki Ohta (M2)
- Junya Kume (M1)
- Takuya Tsutsui (M1)

Tokyo Institute of Technology
- Melodie Ribes (M2)
- Hiraku Sasaki (M1)
- Takashi Inoue (B4)

University of Electro-Communications
- Shunsuke Ohtsuka (M1)

University of Toyama
- Masahito Ogata (M2)
- Shin Suzuki (M2)
- Kenta Yanagisawa (M2)
- Ryosuke Sugimoto (M1)
- Kouki Ito (B4)
- Kiichi Kaihotsu (B4)
- Yuuki Kuromiya (B4)
- Yukino Mori (B4)
- Yuta Ono (B4)

(as of April-June, 2018)

If your affiliation address (or email) changes: Contact Ms. Rie Kikuchi (ICRR).
If your group has new members: Contact Ms. Rie Kikuchi (ICRR), and member-list admins Hideyuki Tagoshi (ICRR) and Sachiko Kuroyanagi (Nagoya U.).
If you have a nice photo: Let the KSC NewsLetter share them.

FROM EDITORS

We are proud of having not received any claims in the premier issue. We need editorial volunteers, and we want your posts and/or leaks of information, if there is to be the next issue.

Please send your inquiries the current editorial staff.

Hisaaki Shinkai (Osaka Inst. Tech.). hisaaki.shinkai at oit.ac.jp
Ayaka Shoda (NAOJ) ayaka.shoda at nao.ac.jp
Yoshihisa Obayashi (ICRR) ooba at icrr.u-tokyo.ac.jp
Kentaro Komori (Tokyo Univ.)
komori at granite.phys.s.u-tokyo.ac.jp

We thank Matteo Leonardi and Simon Zeidler for proof-reading the draft.
Our dream is to get the top download counts in JGWdoc.

