Summary of KIW7

* Summarizing Comments (Hisaaki Shinkai)
* Student Presentation Award (Yuki Inoue)
* Announcement of KIW8 (Sungho Lee)
* Final Remark (Hisaaki Shinkai)

In the history of series of KIW
- The first time to have three parallel sessions.
  experiment/data analysis/theory
- The first time to organize in hybrid style.
- Over 240 participants, largest number ever.

We had
- 23 talks in the plenary sessions
- 16 contirbution talks
- 28 student talks

Hisaaki Shinkai (Osaka Inst. Tech.)
真貝寿明（大阪工業大学）

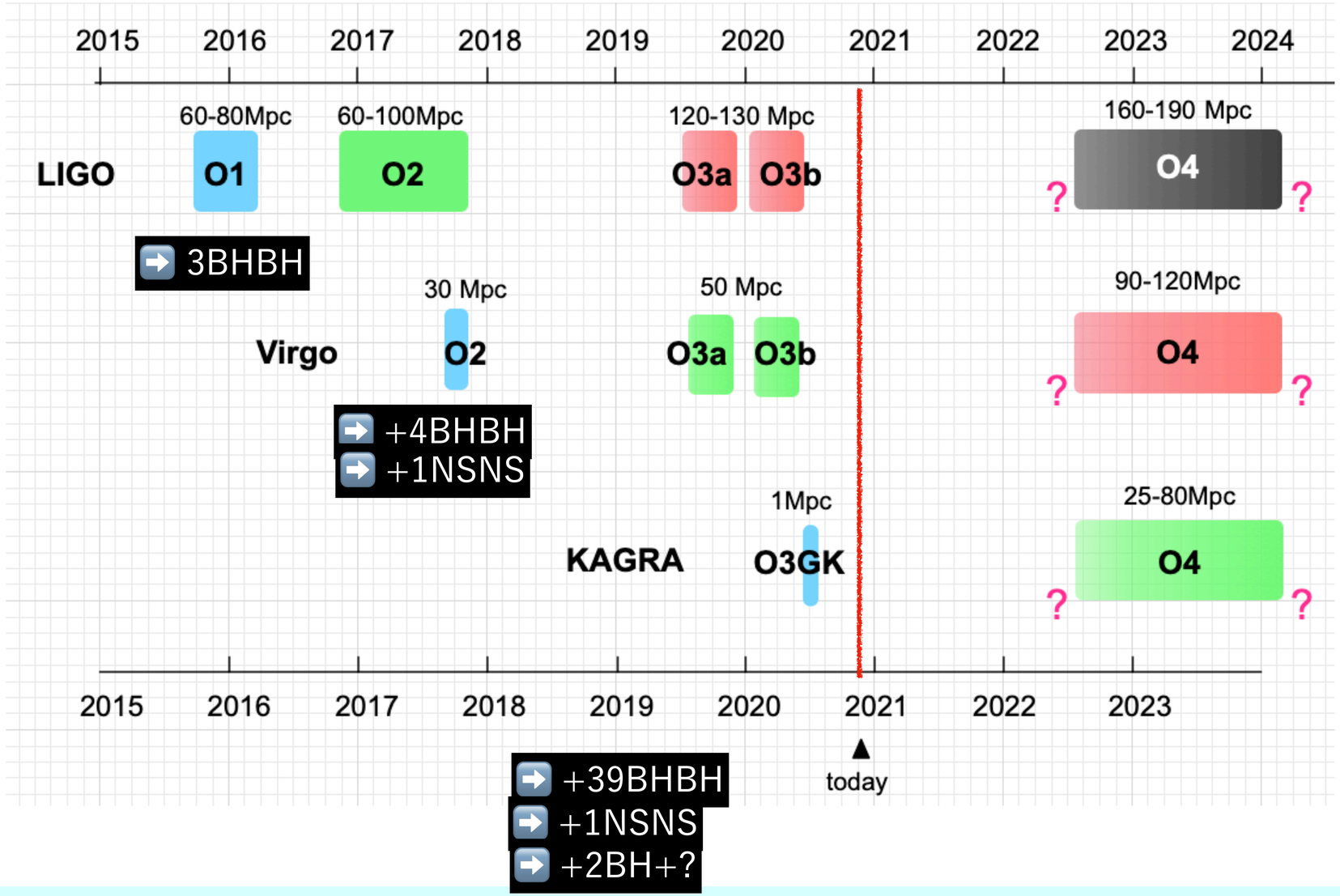
KAGRA Scientific Congress, board chair
on behalf of KIW7 SOC

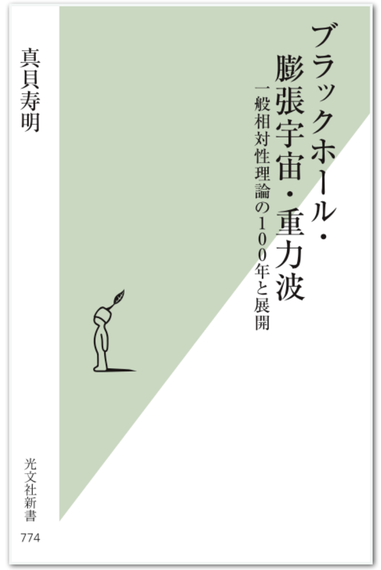
New Technology,	New Idea of Analysis,	& New Physics
Mirror & coating	Convolutional Neural Network	Supernova mechanism
Laser & Optics	Machine learning, deep learning	Asteroseismology
Squeezing of Light	Hilbert-Huan transformation	Jet & GRB
Cryogenic system	Autoregressive method	Binary formation
Suspension system	Butterfly filtering	Peculiar velocity
Vacuum system	Higher-order harmonics	Hubble constant
I/O, interface & tools	Independent component analysis	Dark matter
Interferometer operation	glitch & noise subtraction	CMB & Background GW
Environment monitors	…	Cosmic String
Detector characterization		Extra dimension
Calibration	**Project Reports**	Graviton mass
…	TianQin, NEMO, OSAG …	non-GR objects
		higher curvature theory
		…

Some talks might be a sort of KAGRA internal discussion, but we intended to show them in open-style and call your attention.
If you are interested in these discussion, we are welcome you to join.

In 5 years, …

Five years ago, GW physics was a “future story”. We did not know the existence of BBH, BH over 10 solar mass (except SMBH).
Now LIGO/Virgo announced 50 events in October 2020 as GWTC-2 up to their O3a.



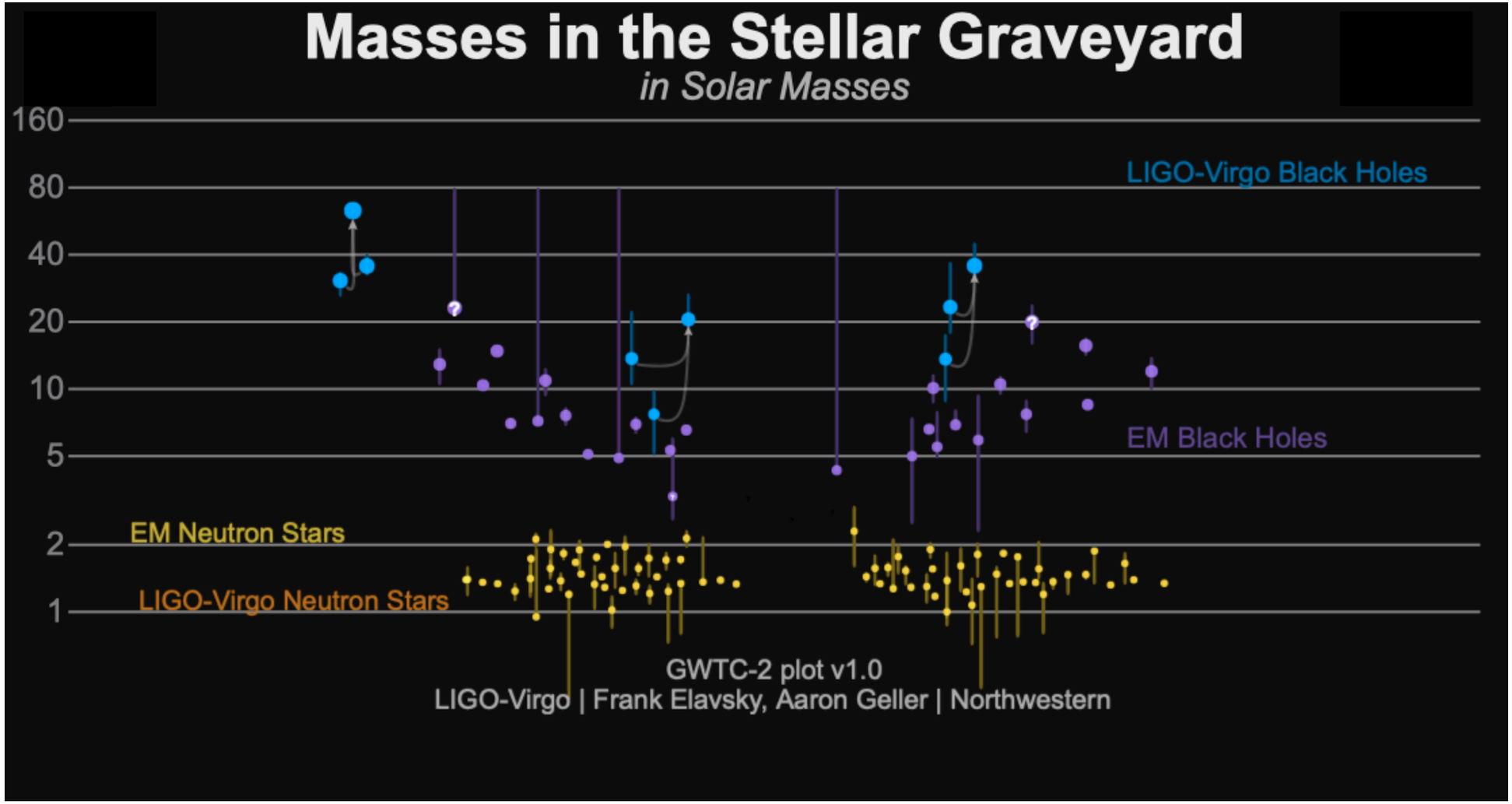


2015 Sep 14

Editor was suspicious
to put GW in the title.

“GW will be detected
within a couple of years. ”

O1 (2015/9/12 - 2016/1/19)

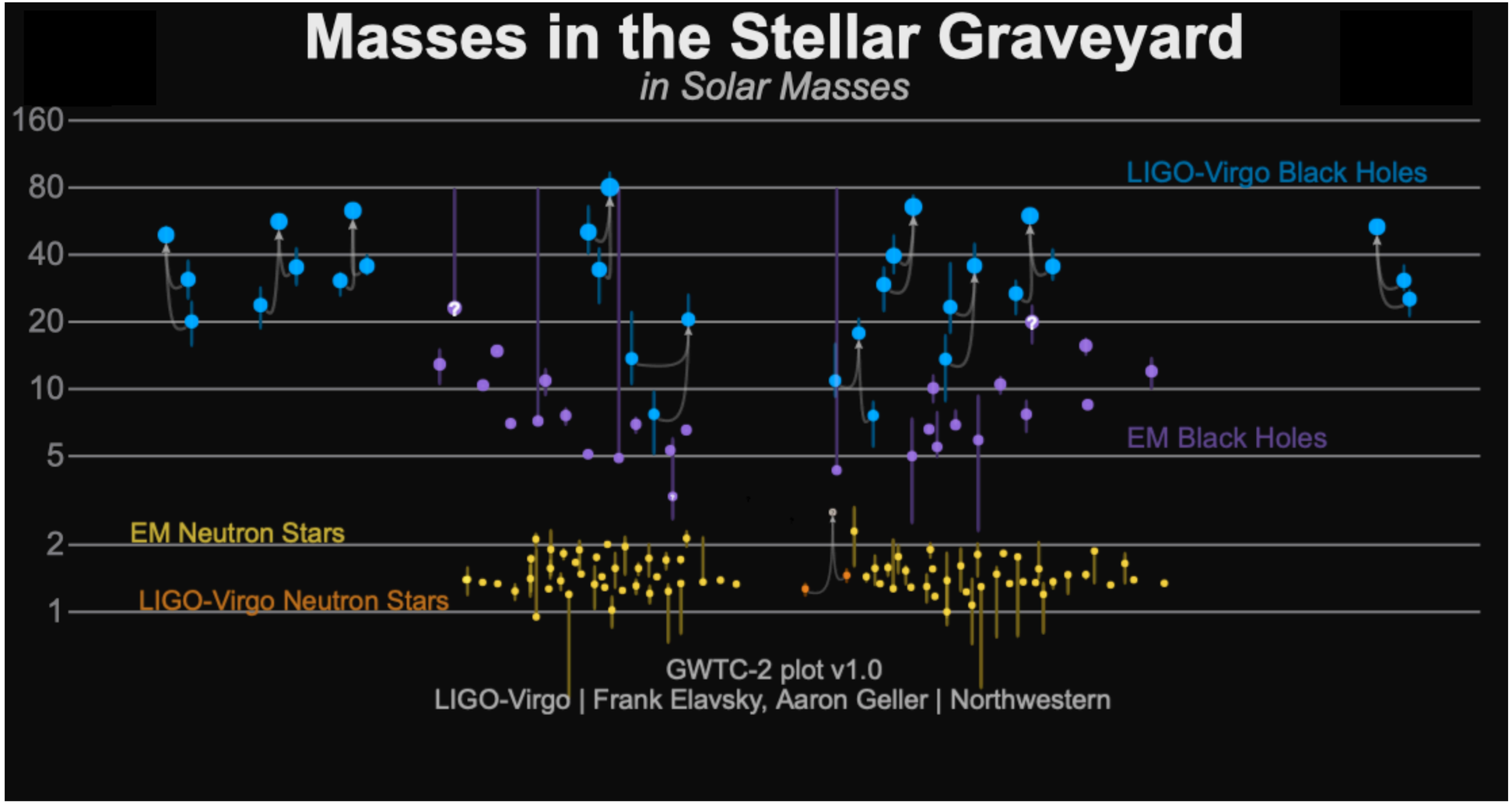


3 BHBH

GW150914: the first ever detection of gravitational waves from the merger of two black holes more than a billion light years away

https://media.ligo.northwestern.edu/gallery/mass-plot

O2 (2016/11/30 - 2017/8/25)　　After O2：GWTC1 (2018/12/3 released)

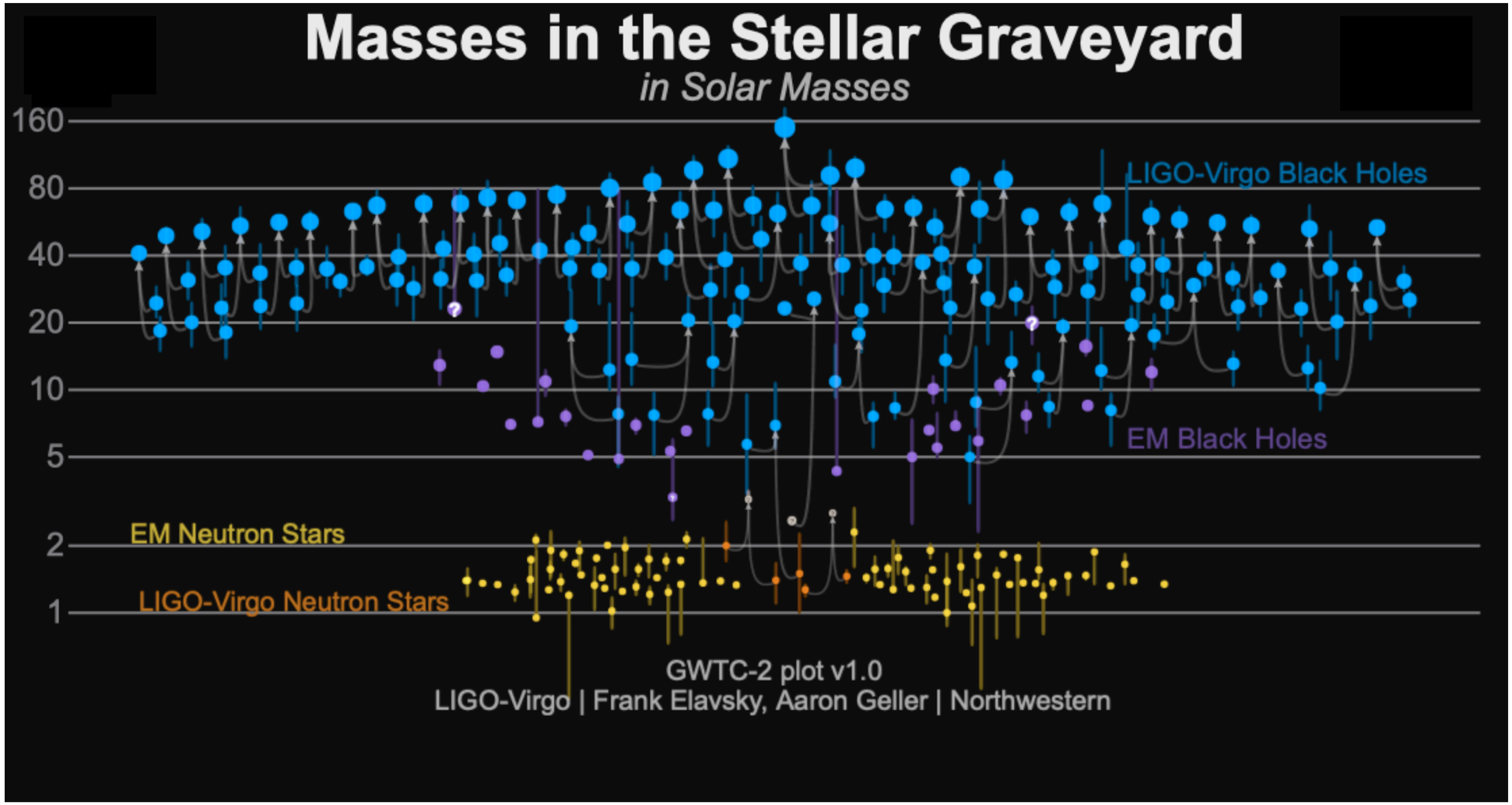


10 BHBH
1 NSNS

- GW170814: the first GW signal measured by the three-detector network, also from a binary black hole (BBH) merger;
- GW170817: the first GW signal measured from a binary neutron star (BNS) merger — and also the first event observed in light, by dozens of telescopes across the entire electromagnetic spectrum.

https://media.ligo.northwestern.edu/gallery/mass-plot

O3a (2019/4/1 - 2019/9/30)　　After O3a：GWTC2 (2020/10/28 released)

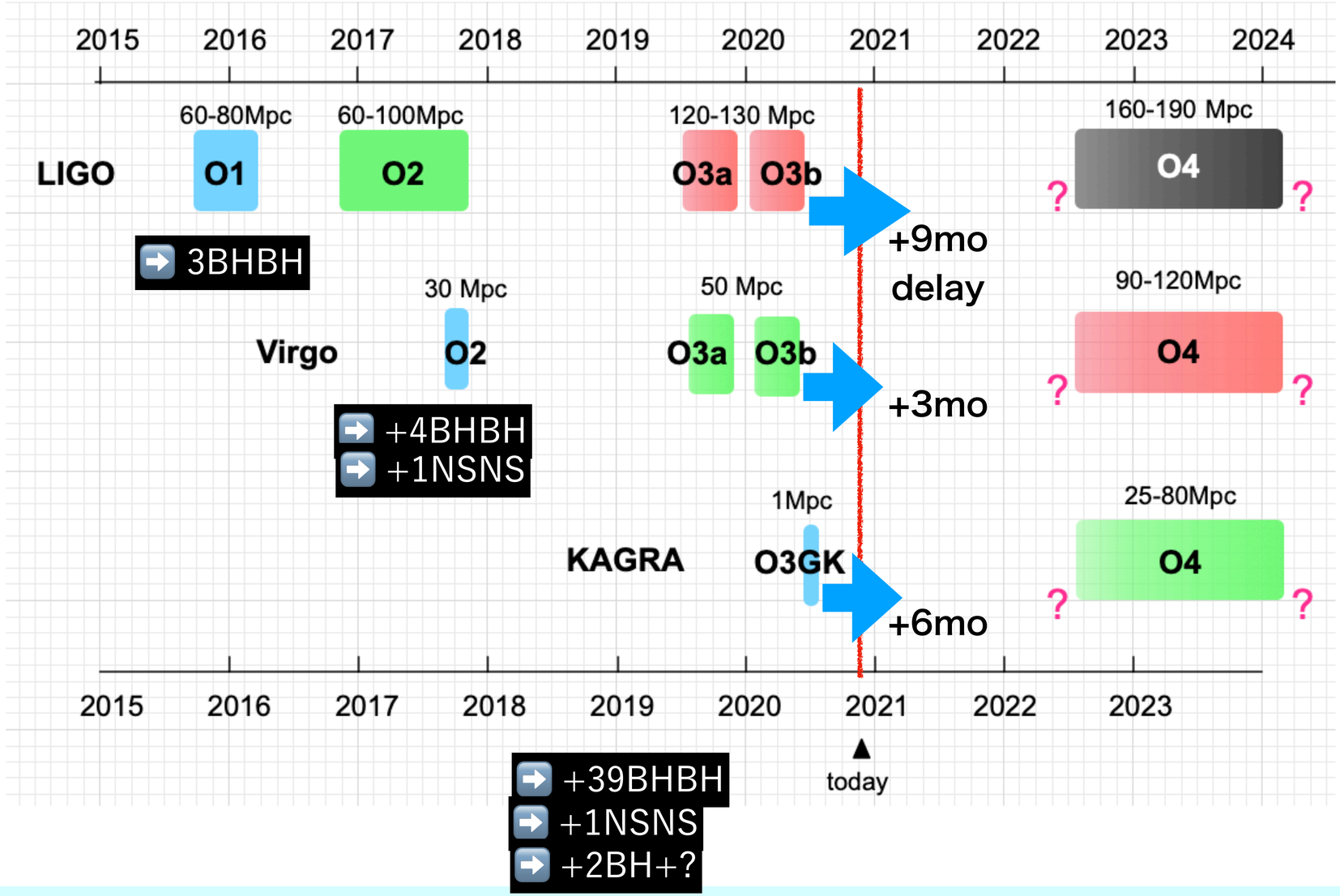


46 BHBH
2 NSNS
2 BH+?

- GW190412: the first BBH with definitively asymmetric component masses, which also shows evidence for higher harmonics
- GW190425: the second gravitational-wave event consistent with a BNS, following GW170817
- GW190426_152155: a low-mass event consistent with either an NSBH or BBH
- GW190514_065416: a BBH with the smallest effective aligned spin of all O3a events
- GW190517_055101: a BBH with the largest effective aligned spin of all O3a events
- GW190521: a BBH with total mass over 150 times the mass of the Sun
- GW190814: a highly asymmetric system of ambiguous nature, corresponding to the merger of a 23 solar mass black hole with a 2.6 solar mass compact object, making the latter either the lightest black hole or heaviest neutron star observed in a compact binary
- GW190924_021846: likely the lowest-mass BBH, with both black holes exceeding 3 solar masses

What's in 2021?

Five years ago, GW physics was a "future story". People did not know the existence of BBH, BH over 10 solar mass (except SMBH).
Now LIGO/Virgo announced 50 events in October 2020 as GWTC-2 up to their O3a.

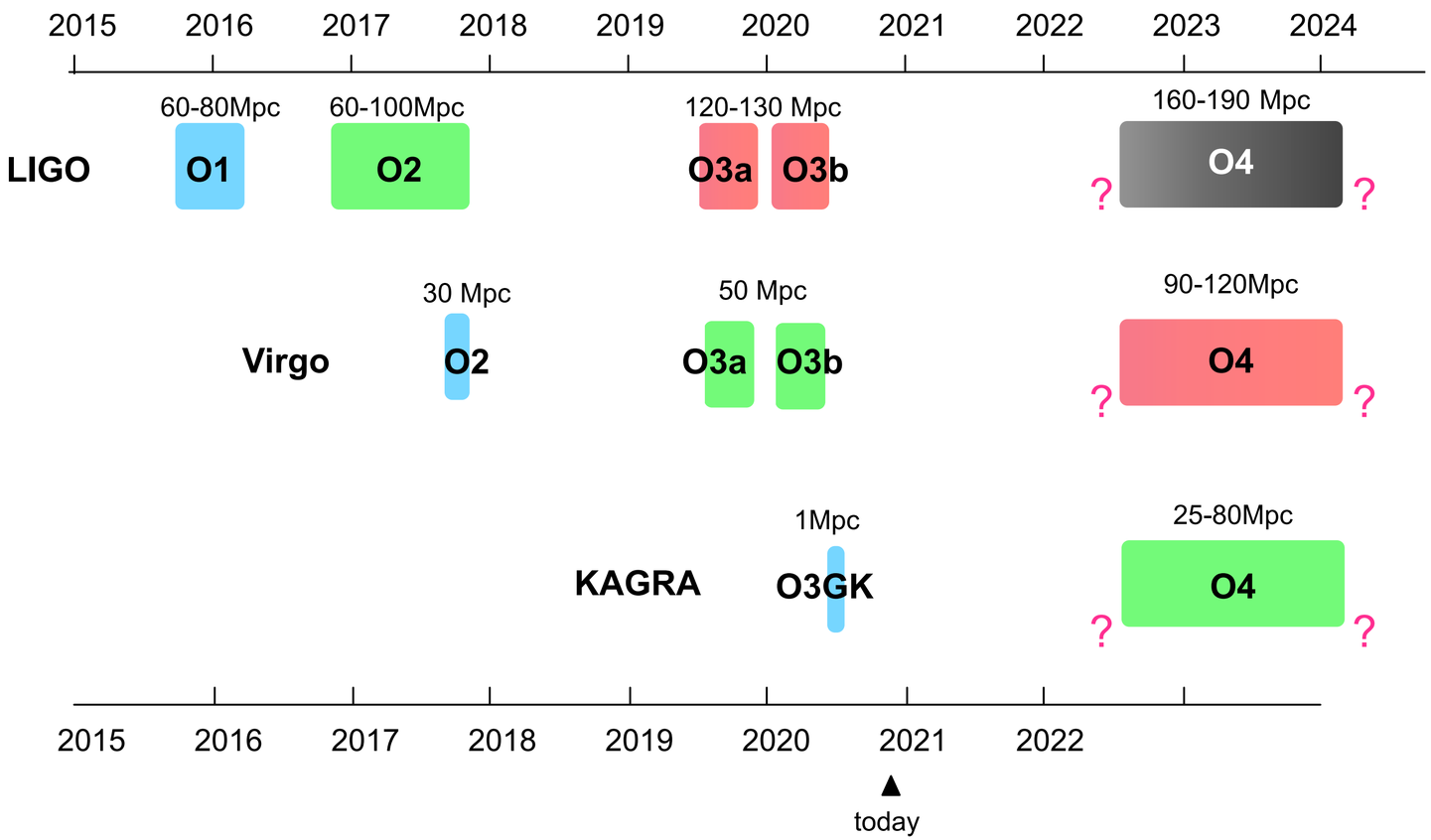


2021 Spring : O3a final analysis
: O3a data release
: O3b catalog
2021 Fall : O3b final analysis
: O3b data release

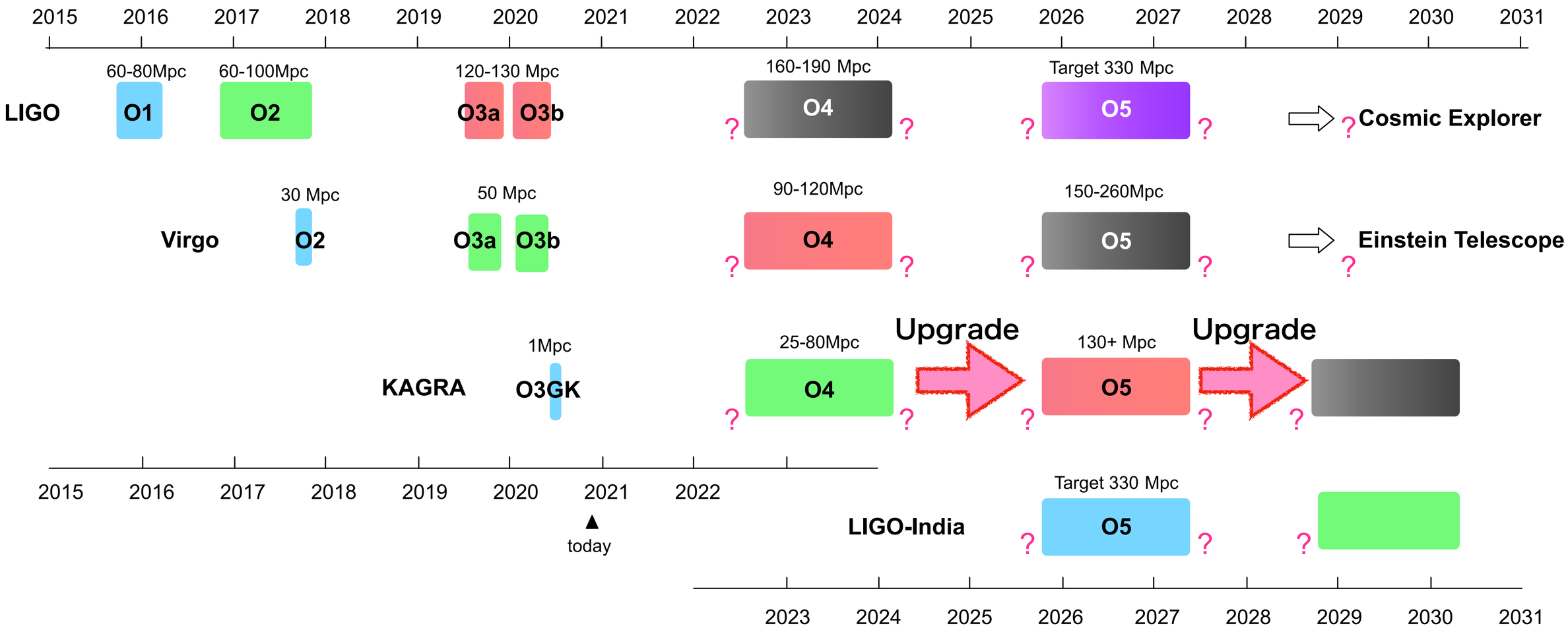
2021
LIGO Hanford: Upgrade
LIGO Livingston: Upgrade
Virgo : Upgrade -> Test Run
KAGRA : Upgrade

2022 June or later
LVK O4 start

Next Decade?


2015
2016
2017
2018
2019
2020
2021
2022
2023
2024
LIGO
60-80Mpc
O1
60-100Mpc
O2
120-130 Mpc
O3a
O3b
160-190 Mpc
O4
?
?
Virgo
30 Mpc
O2
50 Mpc
O3a
O3b
90-120Mpc
O4
?
?
KAGRA
1Mpc
O3GK
25-80Mpc
O4
?
?
2015
2016
2017
2018
2019
2020
2021
2022
today

Next Decade?



Upgrading idea & technology are under discussion.
KAGRA established “Future Strategy Committee”.
KAGRA is an “international project”, and welcome your contributions to work with.

* Student Presentation Award (Yuki Inoue)
* Announcement of KIW8 (Sungho Lee)

Final Remark

KAGRA wanted people to join

* Commissioning, Operation, …
* Data Analysis, …
* R&D, …
* Discussion of Future Design, …

KSC board

Hisaaki Shinkai
Shinji Miyoki
Chunglee Kim
Hideyuki Tagoshi
Tomotada Akutsu

Zhoujian Cao (China)
Hyung-Won Lee (Korea)
Ray-Kuang Lee (Taiwan)
Tatsuki Washimi (PD)
Satoru Takano (Student)

Our next (internal face-to-face) meeting is in Summer 2021, but we will have a telecon in Spring 2021 upon request.

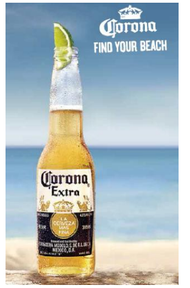
李瑞光教授

If you are planning to join, please contact to your nearest KAGRA collaborators, or consult below FAQ.

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

As a remote participant, I missed coffee, lunch and dinner.
i.e. we missed face-to-face style.

Let's hope we will soon enjoy corona in a different way.



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Academia Sinica,
National Tsing Hua University
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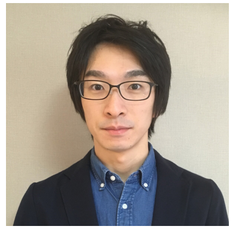
* Especially, local staff in NCU
Hong-Lin Lin
I Putu Wira Hadiputrawan
Ho Tsung Chieh
Miftahul Ma'arif
Hsiang-Yu Huang
Zhi-Ting Tseng



and of course, 井上優貴 Yuki Inoue !

Local Organizing Committee:
- Y.Inoue(National Central University)
- R.K Lee(National Tsing Hua University)
- G.C Liu(Tamkang University)
- F.L.Lin(National Taiwan Normal University)
- K.C.Pan(National Tsing Hua University)
- A.Kong(National Tsing Hua University)

Scientific Organizing Committee:
- S.Haino (Academia Sinica)
- H.Shinkai (Osaka Institute of Technology)
- R.K Lee(National Tsing Hua University)
- T.Washimi(National Astronomical Observatory of Japan)
- A.Kong(National Tsing Hua University)
- C.H.Wu (Soochow University)

Thank you all.
See you at KIW8 again.

LIGO
VIRGO
KAGRA