

Gravitational Wave International Committee (WG.11)
Report to IUPAP

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and Professor David Shoemaker (MIT, GWIC Secretary)*

Period 2021-2024

Professor Matthew Bailes was elected the new GWIC chair at the 2023 annual northern summer meeting. He replaced Jo van den Brand. David Shoemaker continued as the GWIC Secretary.

GWIC facilitates a number of international meetings, overseas significant prizes, provides input to government funding agencies, and helps the different GW (gravitational wave) communities discuss issues at its annual meetings.

The gravitational wave international committee is represented by ground-based detectors working in the audio band such as LIGO, KAGRA, VIRGO, GEO600 and LIGO-India. LIGO, VIRGO and KAGRA work together to coordinate observing, and have witnessed about 200 events now, with the most notable being the first detection of two 30-solar mass black holes (GW150914) and two neutron stars (GW170817). The Space-based community is designing and deploying detectors to work in the millihertz band. Its detector (LISA) is now past adoption as a joint European-US mission and due for launch in the mid-2030s. Its main science targets will be white dwarfs and massive black holes. The nanohertz community uses radio pulsars to create a galactic-scale GW detector aiming at finding the signatures of supermassive black holes. In the future ambitious lunar and space missions might search the decihertz band.

The Amaldi bi-annual meetings are the most important on the GW calendar, and overseen by GWIC. The last (2023) meeting was online-only and administered by the Nanograv collaboration in July 2023. It was well attended with 639 registered participants. In 2021 the meeting was held during the height of the pandemic and was also online, and administered by OzGrav in Australia. In 2025 the 16th Amaldi meeting will be held in Glasgow and be face-to-face for the first time since 2019. It will coincide with the 24th meeting on General Relativity and held concurrently at the same venue. It is expected to attract well in excess of 500 participants. The Amaldi SOC chair is Jessica Steinlechner, with LOC co-chairs Berry and Heng.

A meeting of growing importance is the LISA symposium with funding secured for the LISA detector and a nominal launch date in the mid 2030s. GWIC vets applications for the bi-annual symposium and is about to call for hosts for the 2026 meeting, that usually oscillates between Europe and North America. In 2024 the meeting was held in Dublin, Ireland, with 400 participants.

GWIC also oversees the GW advanced detector workshops, the latest of which was hosted by the ARC Centre of Excellence for Gravitational Wave Discovery (OzGrav) in Hamilton Island in Queensland, Australia. The meeting was at capacity with 120 participants and the 2025 meeting will be held in Florida, USA. The meeting experimented with many panel discussions that were popular with the participants and was chaired by David Ottaway and Bram Slagmolen.

GWIC Chair Bailes presented an overview of the field to the Gravitational Waves Agency Committee chaired by the NSF's Pedro Maronetti in May 2024.

GWIC also helps facilitate the Dawn meetings on the future of gravitational wave science with a focus on instruments and the science cases, that is often well attended by the funding agencies. The latest of these meetings was held at UBC in June of 2024 with about 150 participants.

GWIC continues to oversee the process to award annual prizes to the outstanding PhD thesis in the field of gravitational waves named after Braccini.

The LIGO-VIRGO-KAGRA Scientific Collaboration (LSC) has successfully overseen the birth of gravitational wave science since the first detection in 2015 but is currently under review with the aim of producing a new collaborative structure, to ensure optimal pursuit of gravitational wave science and facility coordination under the new body IGWN, the International Gravitational Wave Network. It is hoped this new body will be operational in 2025.

Since 2015 the field of gravitational wave astrophysics has blossomed. 100 years after the prediction of the existence of gravitational waves, ground-based detectors in the four major runs (O1-O4) have detected about 200 mergers, with the surprising result that most arise from binary black holes. Tremendous momentum and planning behind the so-called third generation detectors is taking place, with site selection work in Europe at an advanced stage for the Einstein Detector concept. In the US, the Cosmic Explorer detector is also exploring potential sites, whilst the technology behind the detectors is being researched internationally. After many years, funding for LIGO-India is now established, a site secured and construction underway for the 3rd 4km detector, planned to be operational in the early 2030s. Some exploratory funding for an Australian detector has been approved by Astronomy Australia Limited that will explore sites and industry connections.

In the Nanohertz regime pulsar timing arrays from the US, Australia, Europe/India and China published the first evidence for a gravitational wave background in 2023, with recent results from the South African MeerKAT array recently accepted for publication. There is continuous evolution in the international network participating in these searches, both in the radio telescopes involved and their sensitivity.

An exciting new initiative is from GWECS, the gravitational wave early-career scientists network. This community-driven initiative aids young scientists navigate their careers through online meetings.

Membership of GWIC:

1. Matthew Bailes
2. Patrick Brady
3. David McClelland
4. Karsten Danzmann
5. Matthew Evans
6. David Garfinkle
7. Gianluca Gemme
8. Kelly Holley-Bockelmann
9. Jim Hough

10. Bala Iyer
11. Takaaki Kajita
12. Michael Kramer
13. Luis Lehner
14. Giovanni Losurdo
15. Michele Punturo
16. Dave Reitze
17. Sheila Rowan
18. Sendhil Raja S
19. Bernard Schutz
20. Peter Shawhan
21. David Shoemaker
22. Stephen Taylor
23. Ira James Thorpe
24. Stefano Vitale
25. Bhal Chandra Joshi
26. Masaki Ando
27. Shuichi Sato
28. Golam Shaifullah