

## IAU Commission D1: Gravitational-Wave Astrophysics Annual Report for 2022-2023

IAU Commission D1 was created in 2015 with the goals of integrating gravitational-wave (GW) observations into mainstream astronomy, expanding the knowledge and science impact of GW astrophysics to the IAU community, and fostering communication among diverse communities of observers and theorists. Commission D1 currently has 220 members, and the membership continues to grow.

The year 2022-2023 saw the LIGO-Virgo-KAGRA collaboration preparing for the upcoming observing run (scheduled to start in May 2023) while also publishing results from several analyses performed on previous data. The major Pulsar Timing Array (PTA) projects in Europe, Australia, India and North America continued to monitor pulsars and analyze the growing datasets to try to home in on a very-low-frequency gravitational-wave signal that analyses released in 2020-2022 have hinted at.

Among the proposed space missions, the Laser Interferometer Space Antenna (LISA) passed its comprehensive “Mission Formulation Review” (MFR). The review team, consisting of experts from ESA, NASA, the scientific community and industry, identified no showstoppers and confirmed that LISA has reached a maturity sufficient to proceed to the next stage of development, with a target launch date in the mid 2030s.

Plans for third generation ground-based GW detectors are progressing in Europe and USA. The Europe-based Einstein Telescope (ET) Collaboration was created to organize the scientific community around the project, in parallel with the ongoing ET site selection process and other technical preparations. The US-based Cosmic Explorer project released its Horizon Study, and the National Science Foundation has made funding available for research projects to inform the design of a next-generation GW detector or detectors.

The Commission D1 Steering Committee met 3 times online and helped to coordinate letters of intent and proposals for Symposia and Focus Meetings. In particular, the committee helped to shape the GW Astrophysics symposium proposal, to be part of the General Assembly program in August 2024 in Cape Town.

The Committee created a list of meetings of interest to its members on the IAU website ([https://www.iau.org/science/scientific\\_bodies/commissions/D1/info/meetings/](https://www.iau.org/science/scientific_bodies/commissions/D1/info/meetings/)), and is maintaining it. The Committee is also assembling a list of online resources that are of interest to the wider GW astronomy community, to be maintained at [https://www.iau.org/science/scientific\\_bodies/commissions/D1/info/usefulresources/](https://www.iau.org/science/scientific_bodies/commissions/D1/info/usefulresources/).