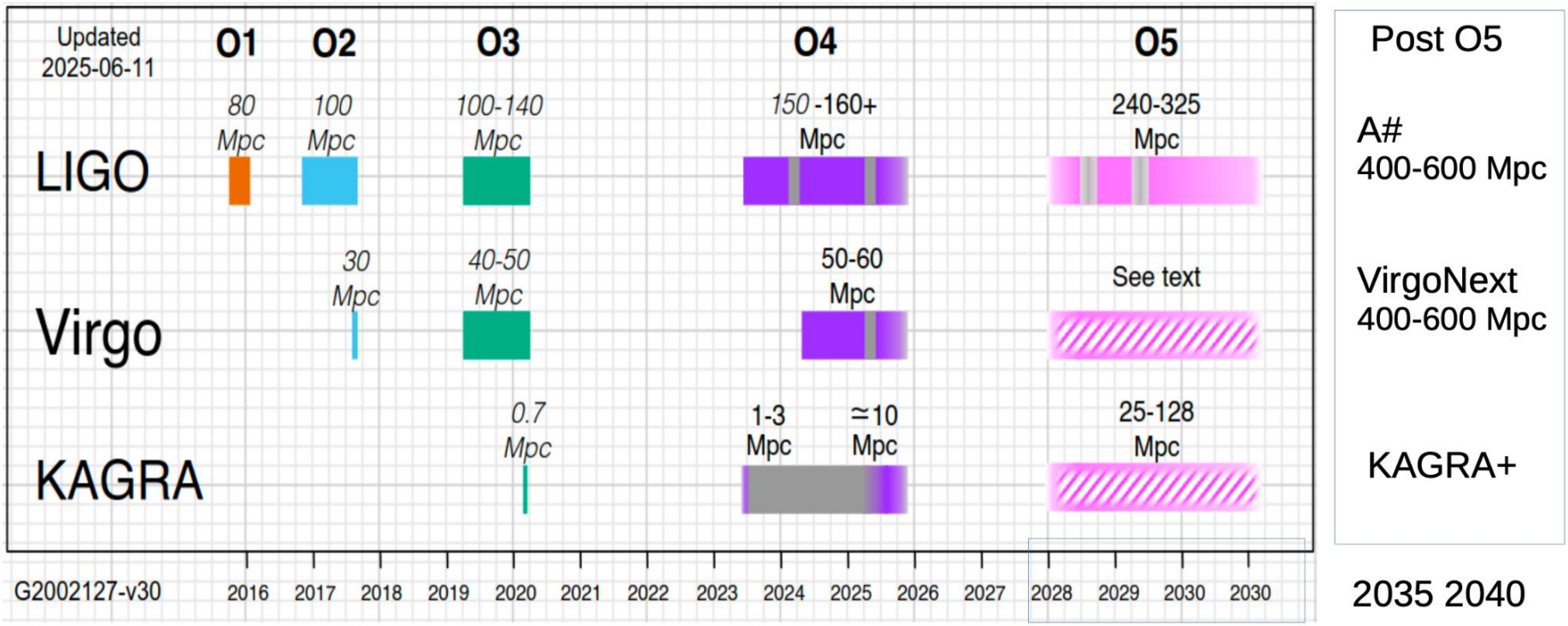
The Next 10 Years

Past 10 years → Future 10 years

LVK upgrade program : 2025 - 2035



Marie-Anne's lecture

Past 10 years vs Future 10 years

What was the chance to discover GWs, if it would has happened?

- GW data coverage (O1-O4): two detectors - 25%, single detector - 9%
  - O1 had a lower sensitivity, Virgo is much less sensitive.
- Sky coverage: ~80%
- Fraction of detectable GWs in Milky Way: ~10%
- Lower mass stars (<15Msun) and non-rotating stars in Milky Way
- **Overall: ~1%**

Can we do better in the next 10 years? **What, as a community, can we do to increase the chances of a discovery?**

- GW data coverage (O5-O6): more detectors, better coverage
- Larger sky coverage
- Fraction of detectable GWs in Milky Way: it will increase (hardware and hopefully software)

"Observers want to work with the observable" Sergey

White Paper and Proceedings

- CQG proceedings: https://iopscience.iop.org/collections/cqg-250513-841
- "Deadline": 31 Dec 2025
- **Everybody is welcome!** Regardless if you give a talk or if you attend the Symposium
- A White Paper will summarize the state of the art of the fields and provide recommendations
- We will have a slack channel for communication
- Regular meetings online? Rate of 1 per month?

Classical and Quantum Gravity

Focus on Core Collapse Supernova Gravitational Wave Astronomy and Astrophysics: Past, Present, and Future

Guest Editors

Marek Szczepańczyk, *University of Warsaw, Poland*
Marco Cavaglia, *Missouri University of Science and Technology, United States*
Anthony Mezzacappa, *University of Tennessee Knoxville, United States*
Jade Powell, *Swinburne University of Technology, Australia*

Scope

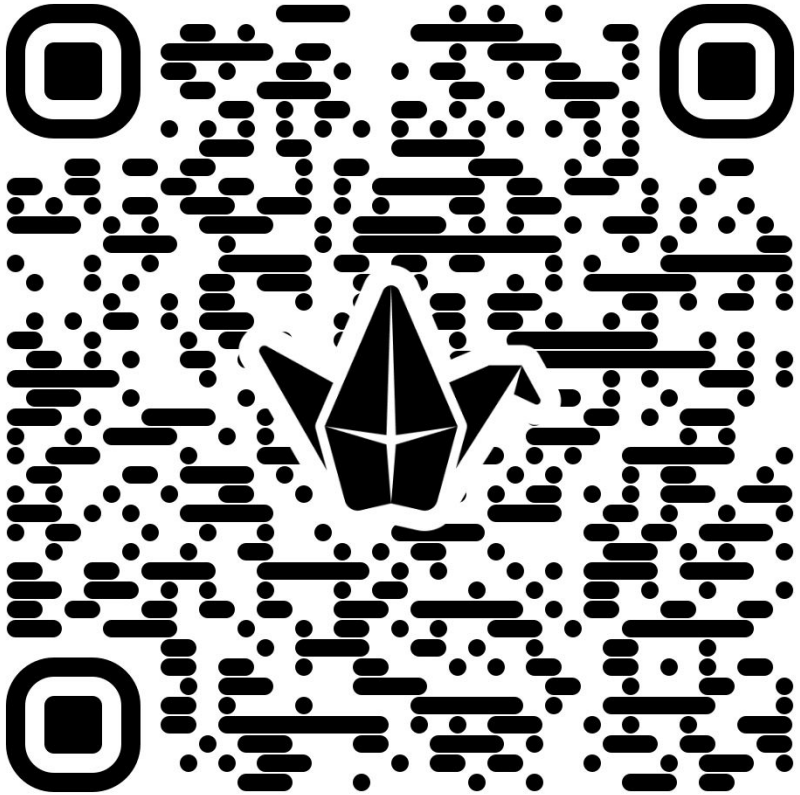
The LIGO, Virgo, and KAGRA (LVK) observatories are designed to detect gravitational waves (GWs) from a wide variety of sources, including compact binary mergers, core-collapse supernovae, and isolated pulsars, among others. Only the

SN2025gw White Paper Outline

- Motivation for the Symposium
- Details of the Symposium
  - Time and Place
  - Participant List
  - Schedule
  - Book of Abstracts
- Progress across Major Areas of Relevance for CCSN Theory, Detection, and Parameter Estimation
  - Theory
  - GW Detection and Parameter Estimation
  - Neutrino Detection
  - Electromagnetic Signatures
- Lessons Learned
- Immediate Needs Identified
- Opportunities
- Next Steps
  - Specific Actions for Specific Needs
  - Organizing and Interfacing the Community
  - Responding to Opportunities

Discussion: next 10 years

Theory
Detection
Neutrino
Electromagnetic



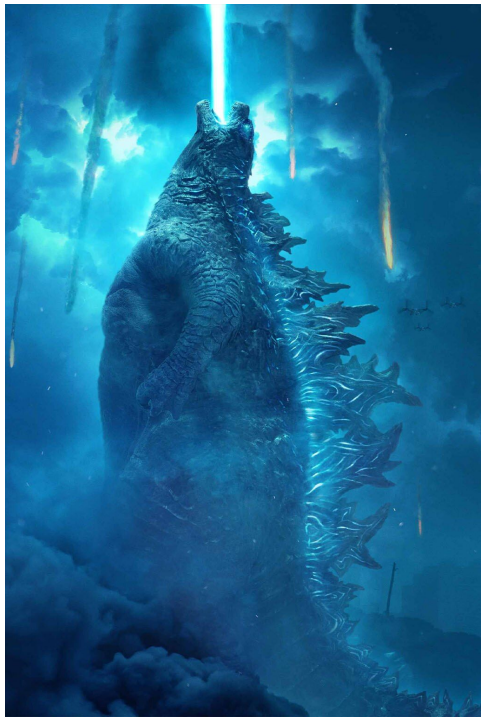
- What significant progress can we expect?
- How to increase the chances of a discovery?

Extra

Neutrino data

Simulation:

200 GB



Reduced Data:

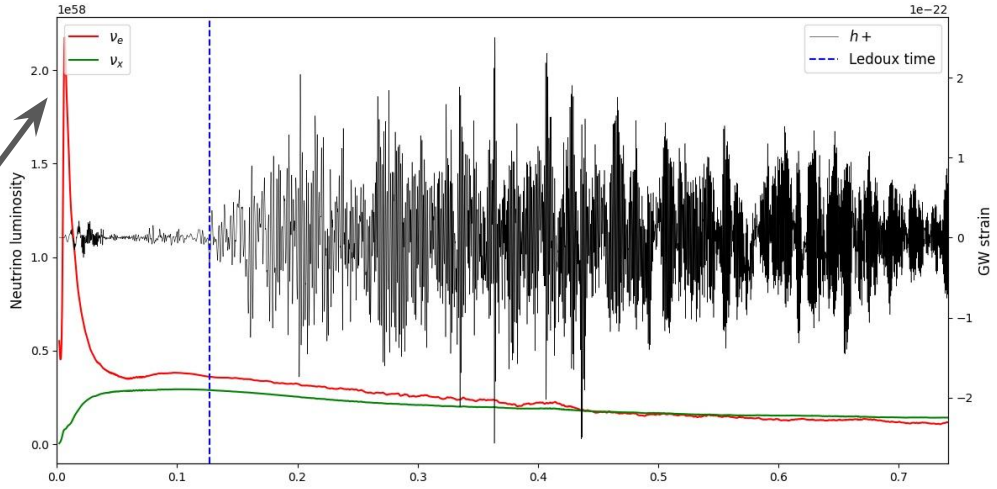
5 GB

Marek needs:

2 Bytes

(Observational)

time of the collapse



10 year discussion