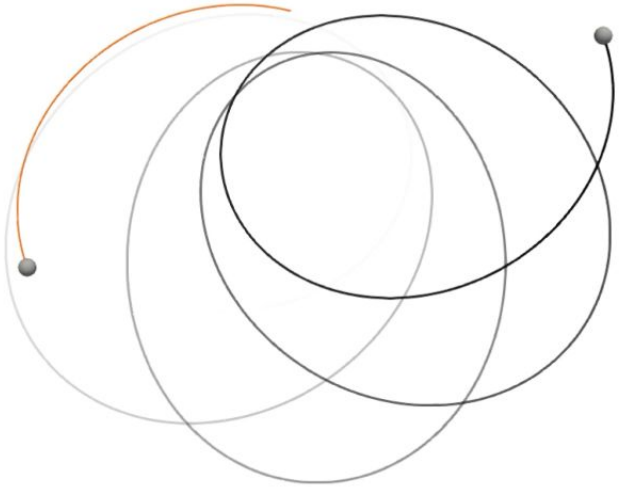


Gravitational waves from compact binary mergers

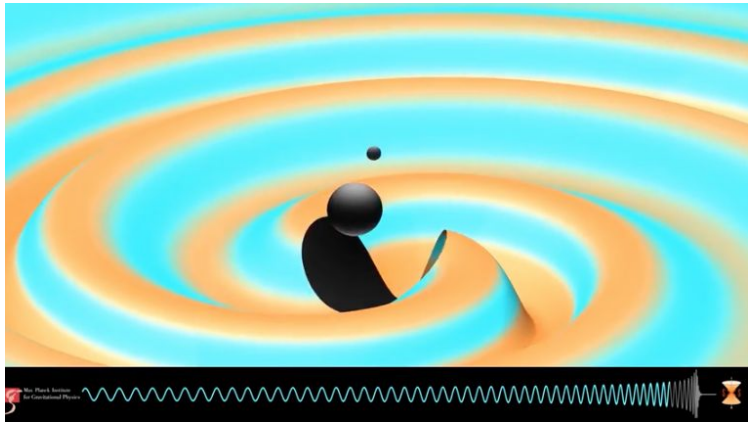
Antoni Ramos-Buades and Maria Haney

MSc and BSc students: Suzanne Lexmond, Jord Muffels, Amin Rouan Serik, Pieter Oehlers

Gravitational waves group
Nikhef Amsterdam

GRAVITATIONAL WAVES: A NEW ERA IN ASTRONOMY

- Compact objects in binaries: neutron stars, **black holes,** …



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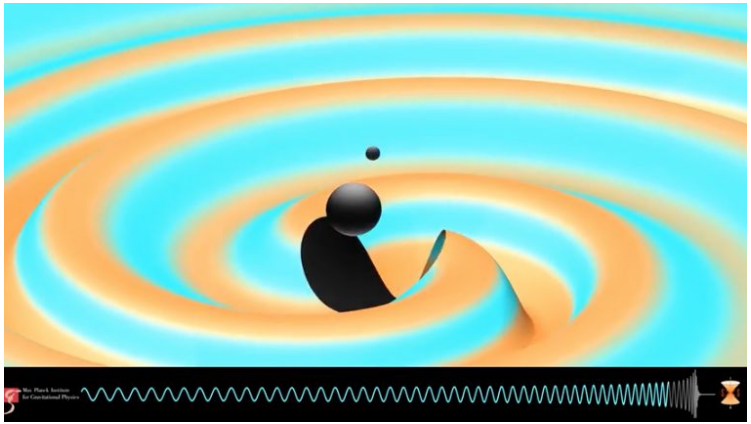

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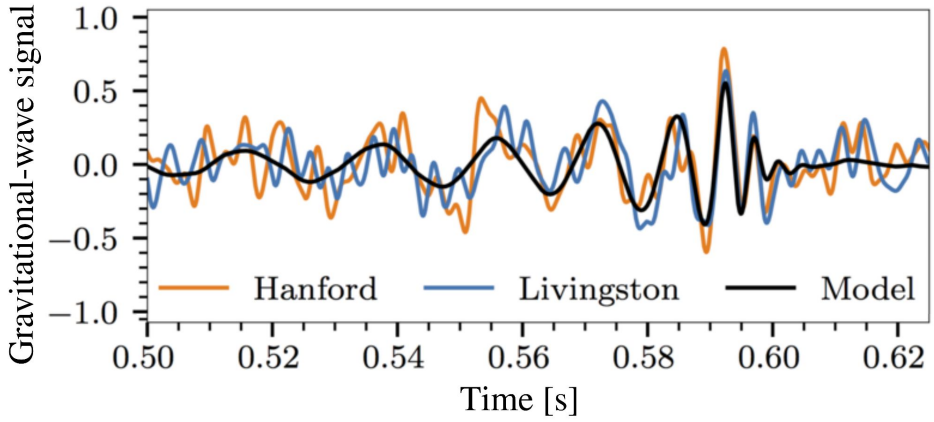

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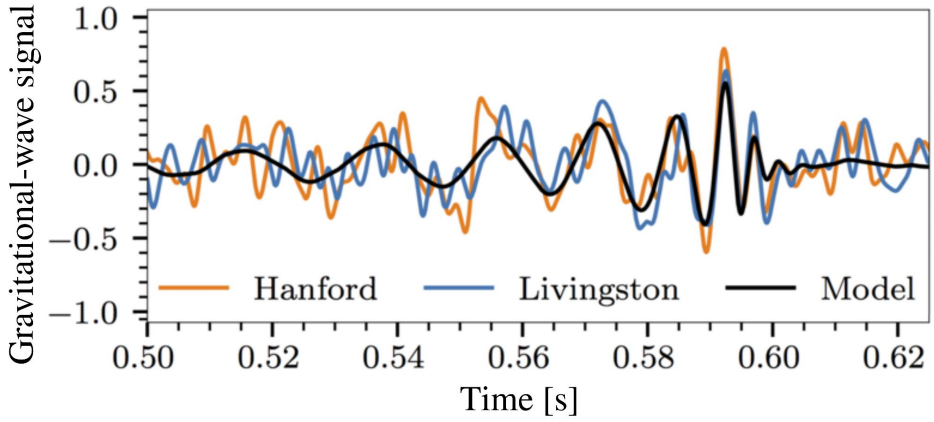

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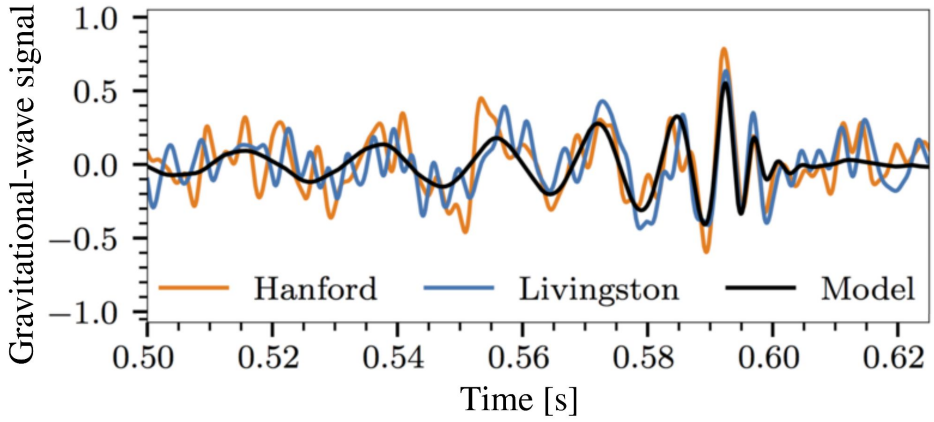

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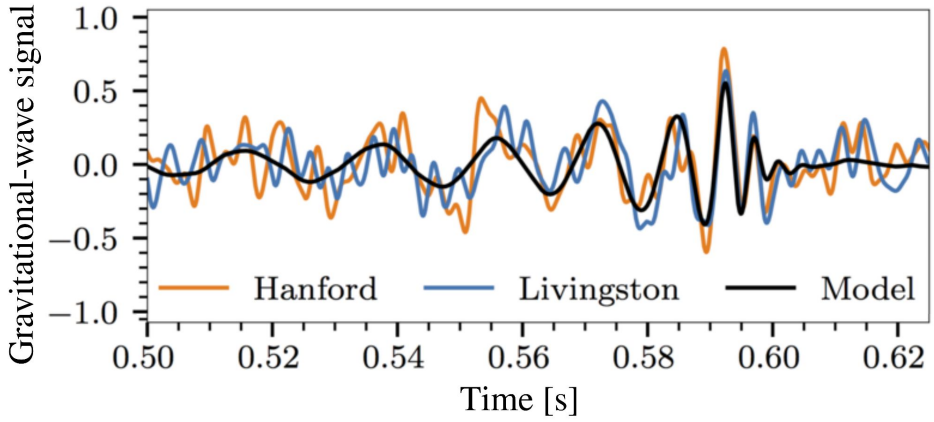

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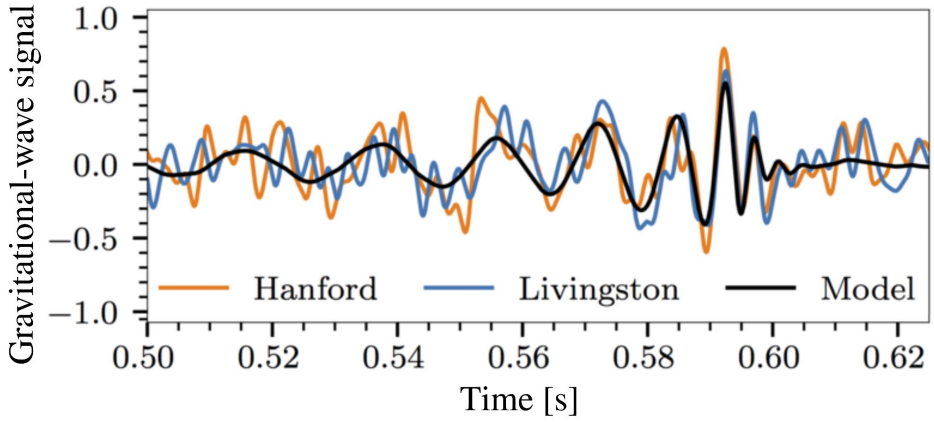

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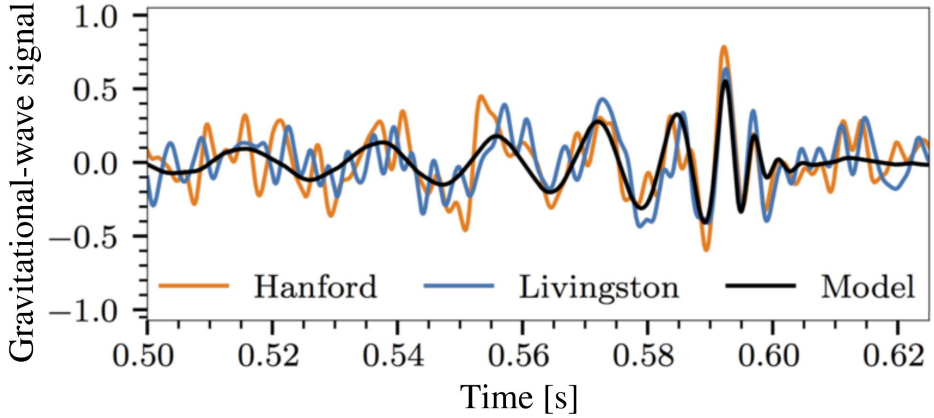

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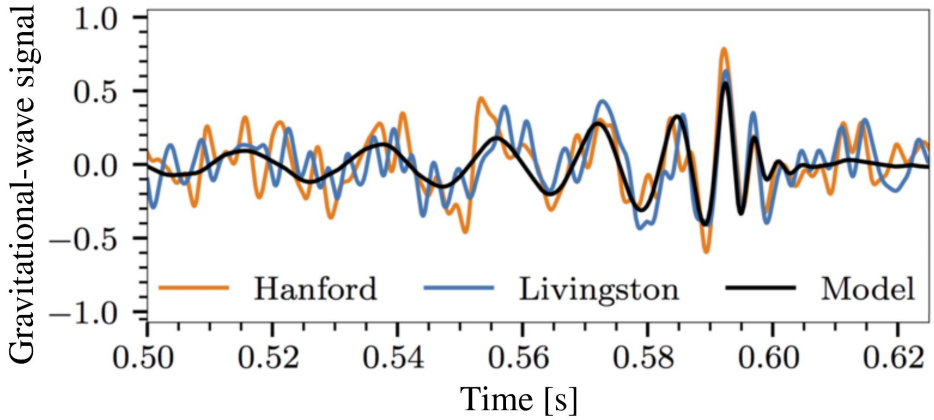

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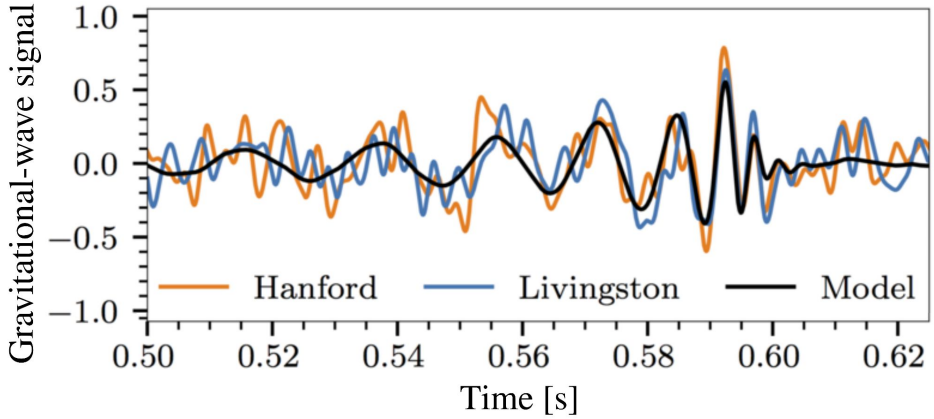

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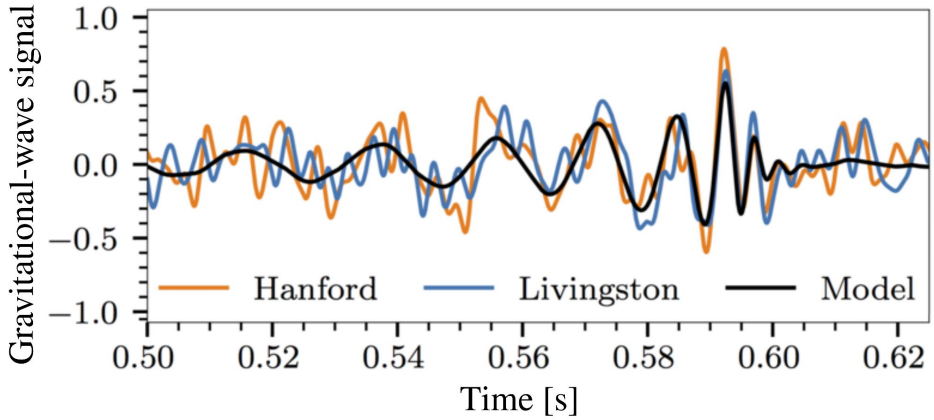

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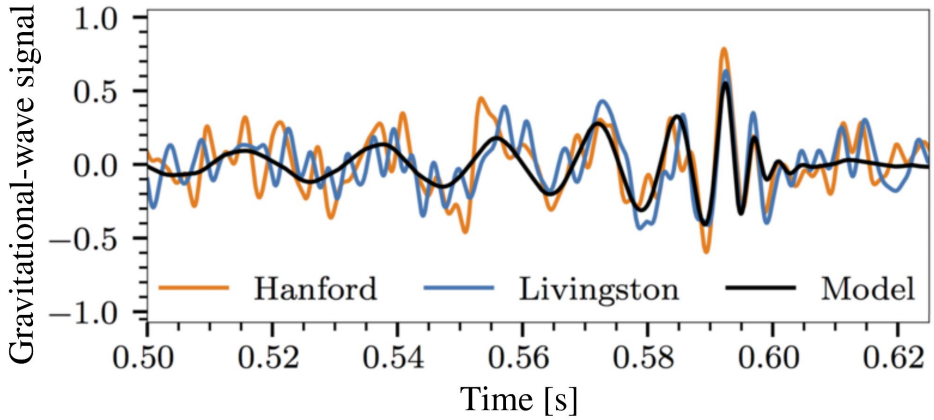

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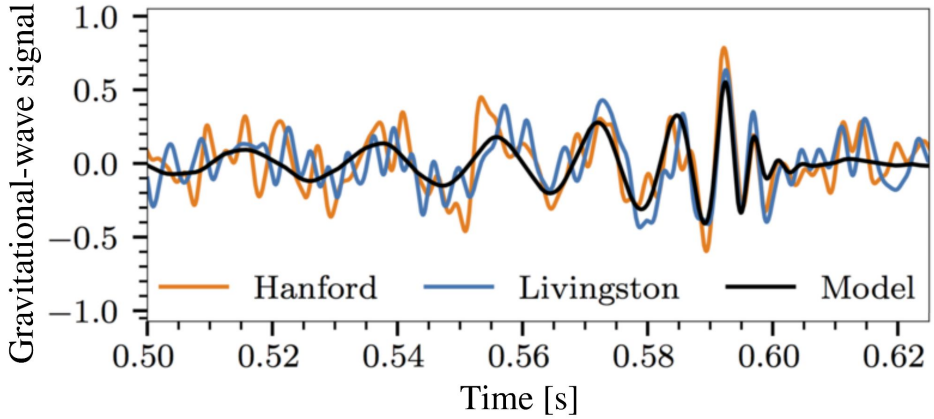

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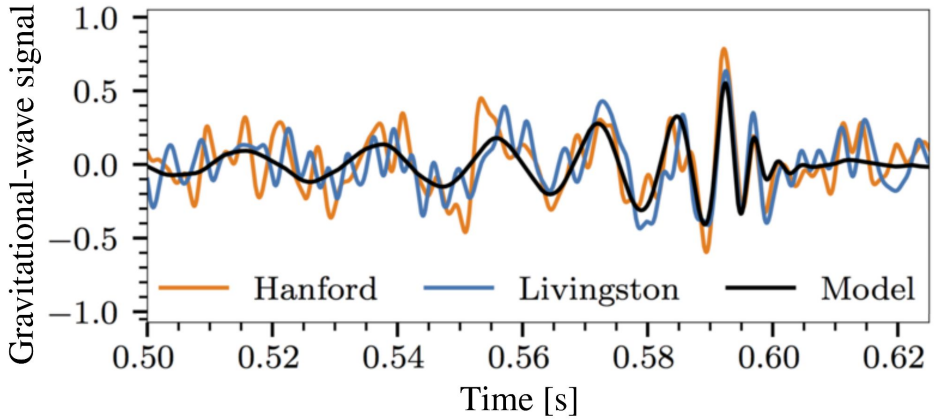

A more complete understanding of the Universe!

CHALLENGES

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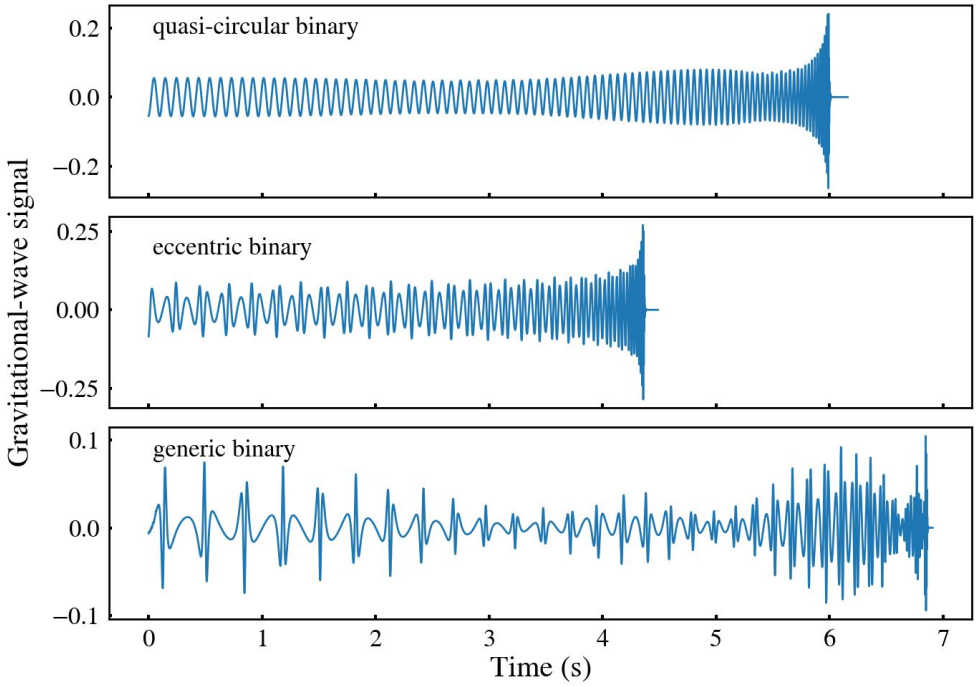

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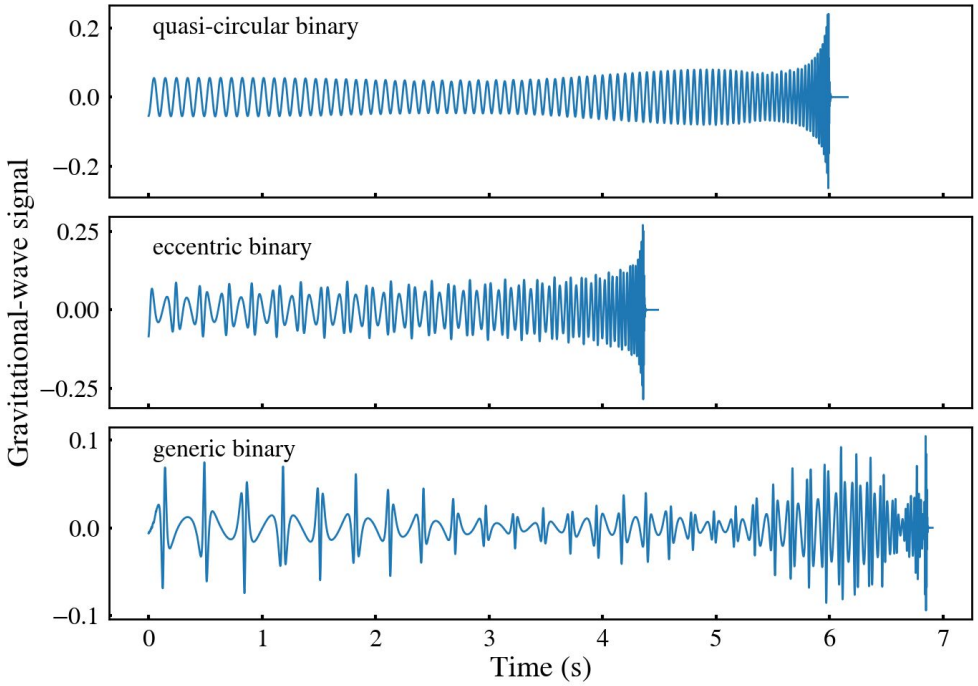

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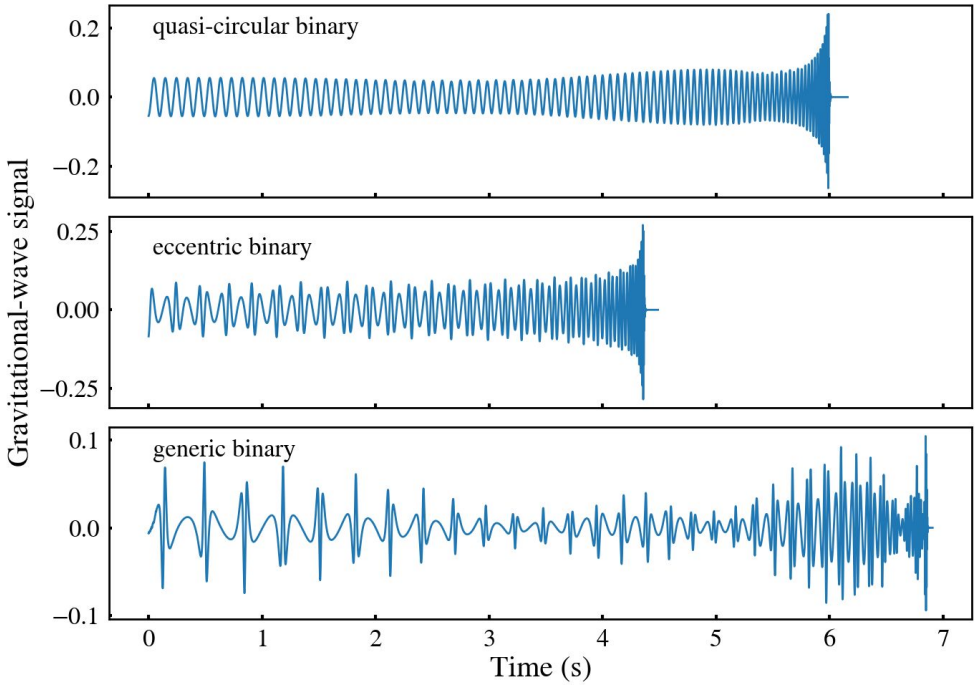

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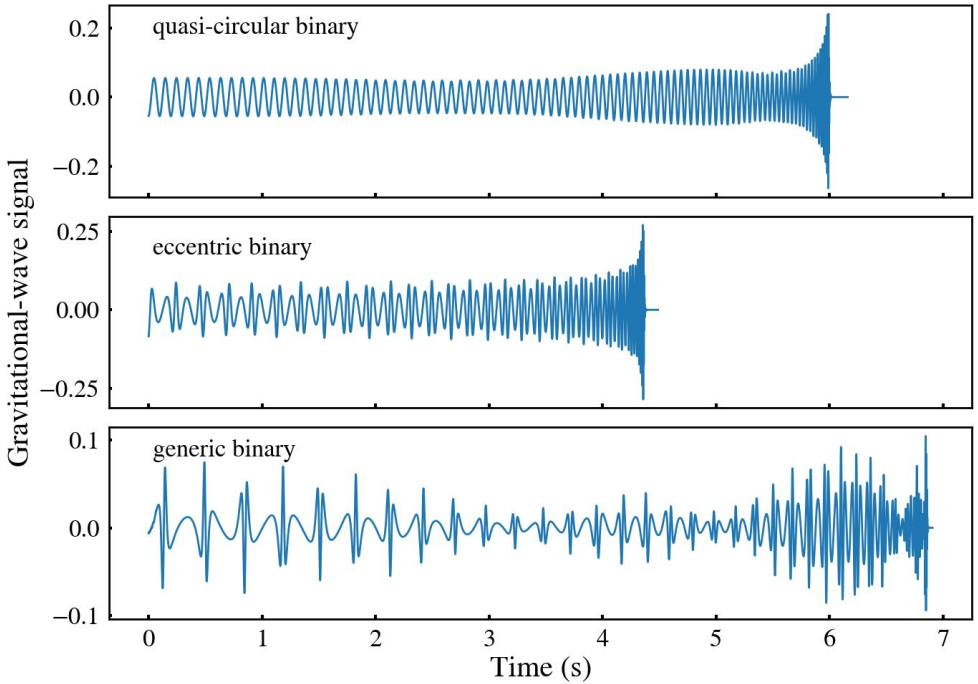

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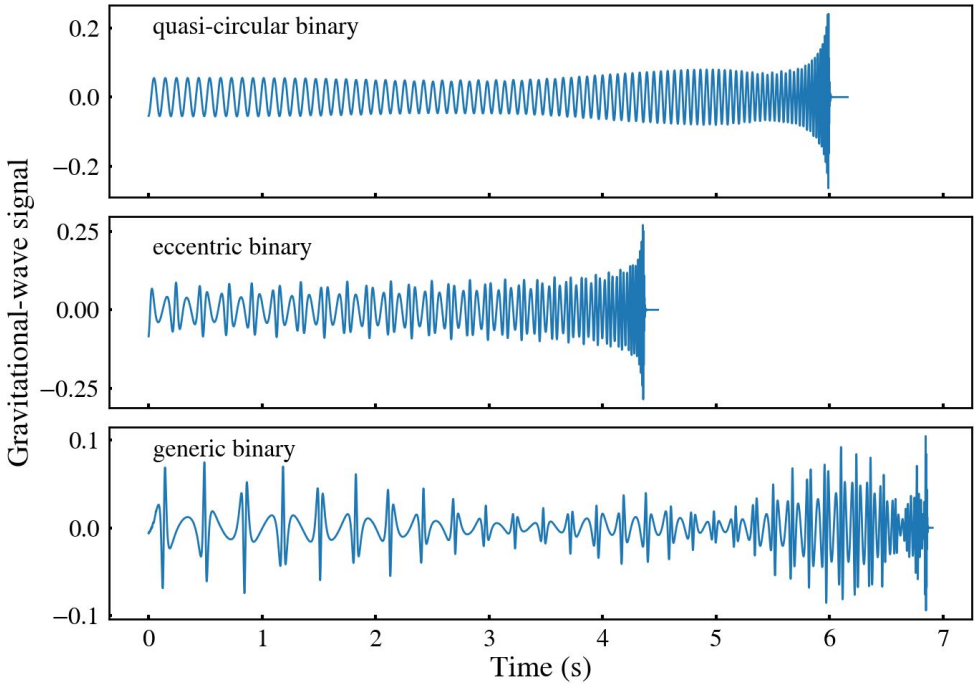

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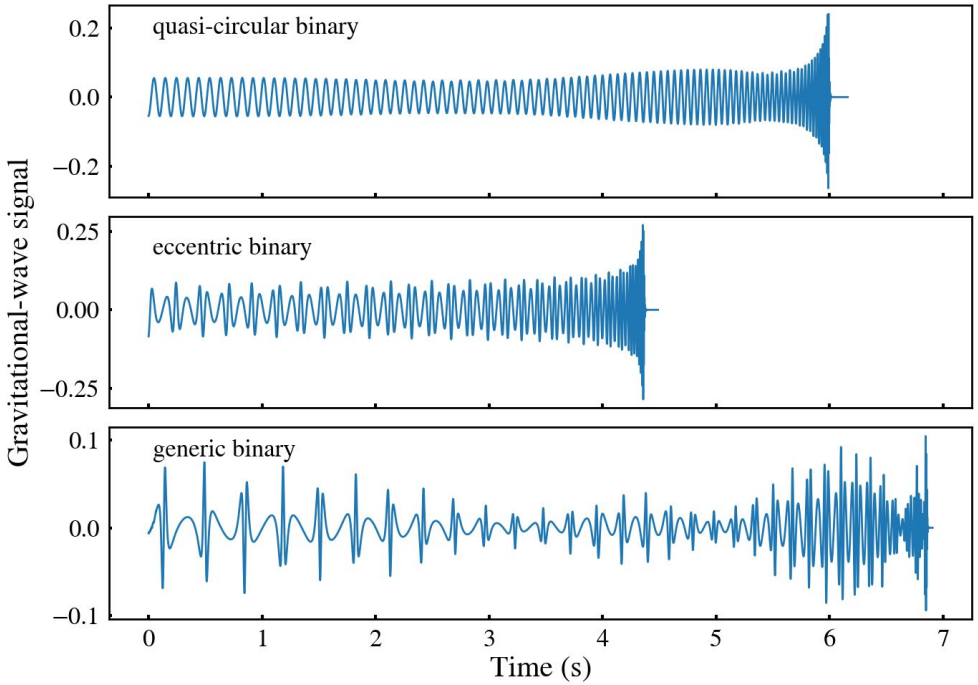

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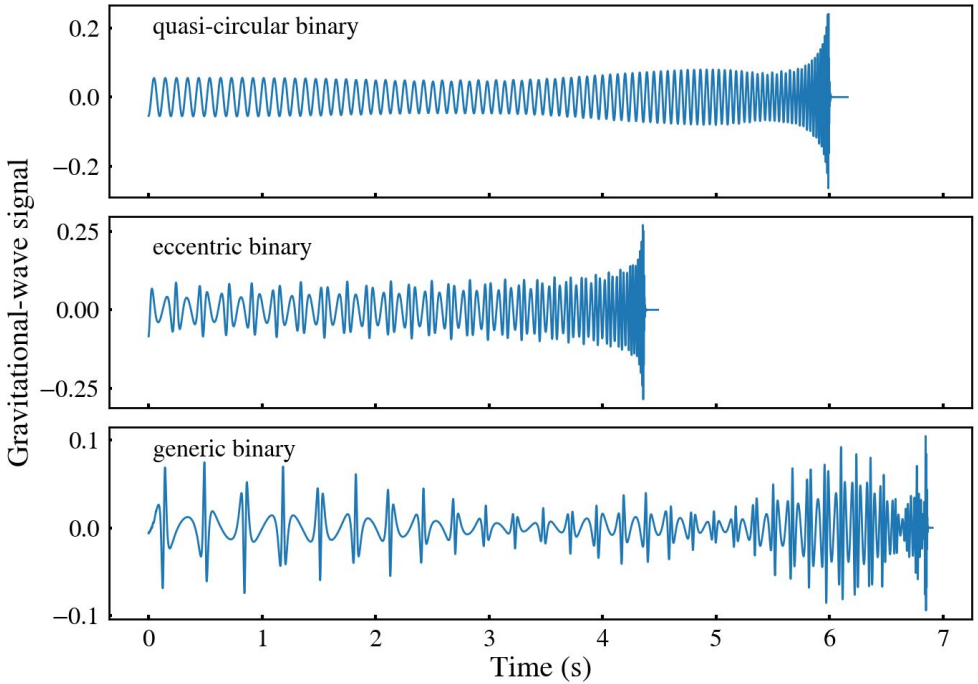

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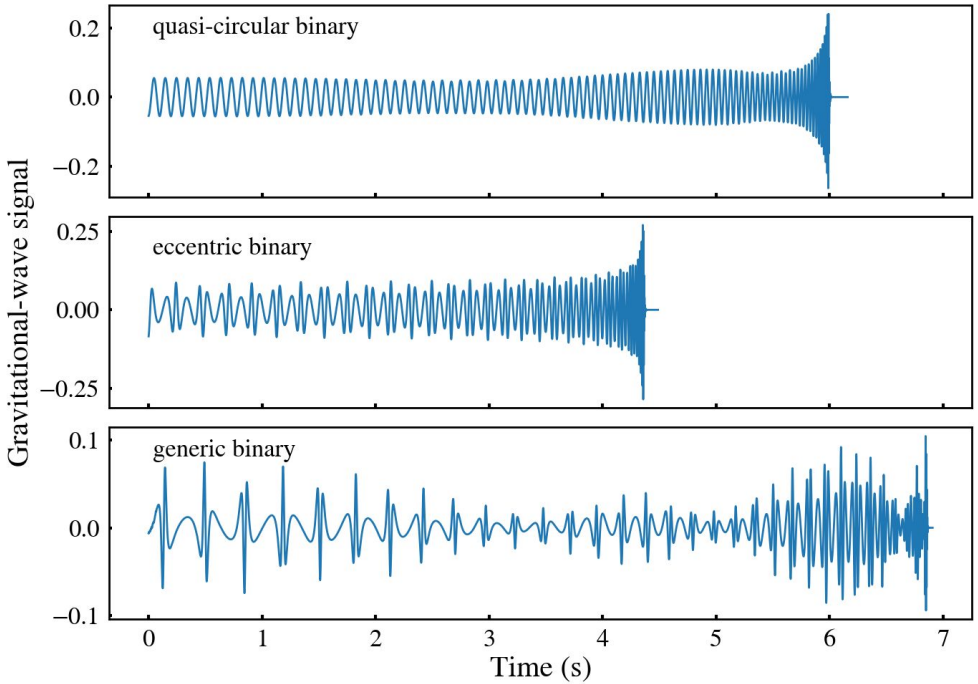

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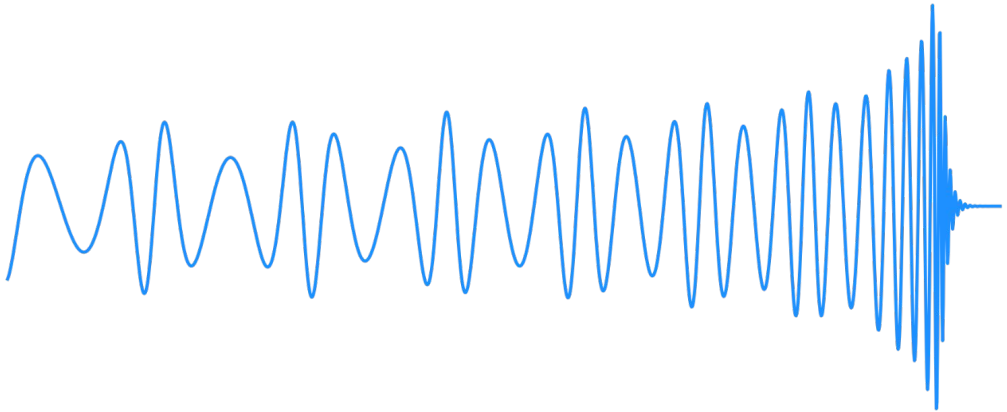
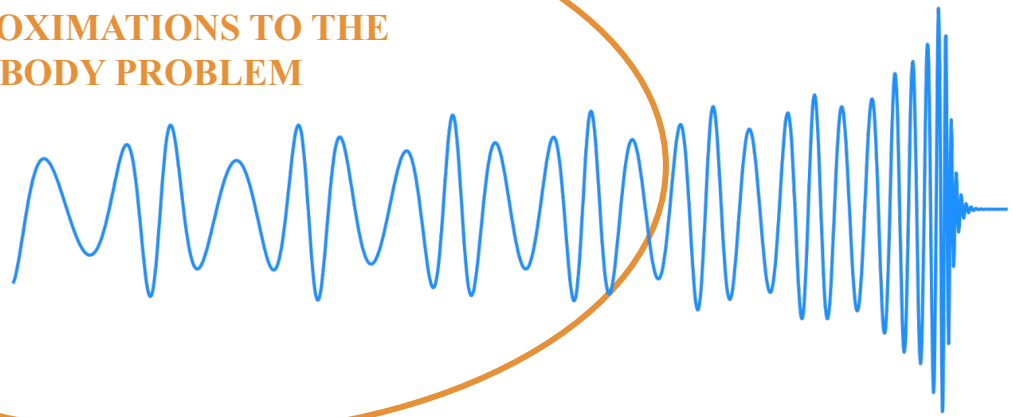


MODELING WAVEFORMS

SEMI-ANALYTICAL APPROXIMATIONS TO THE TWO-BODY PROBLEM



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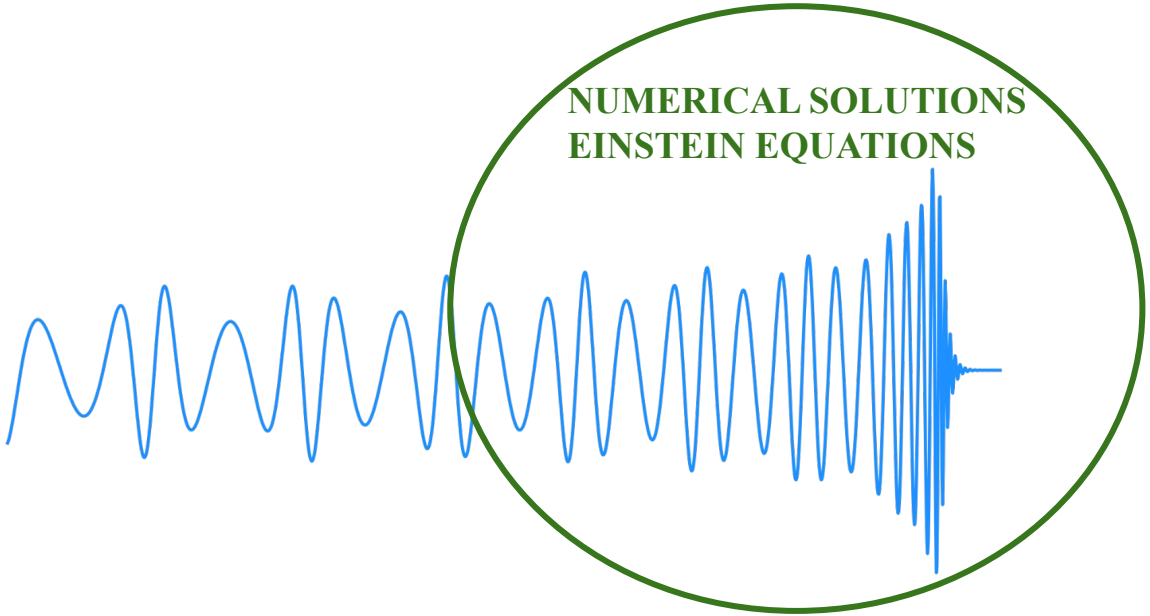

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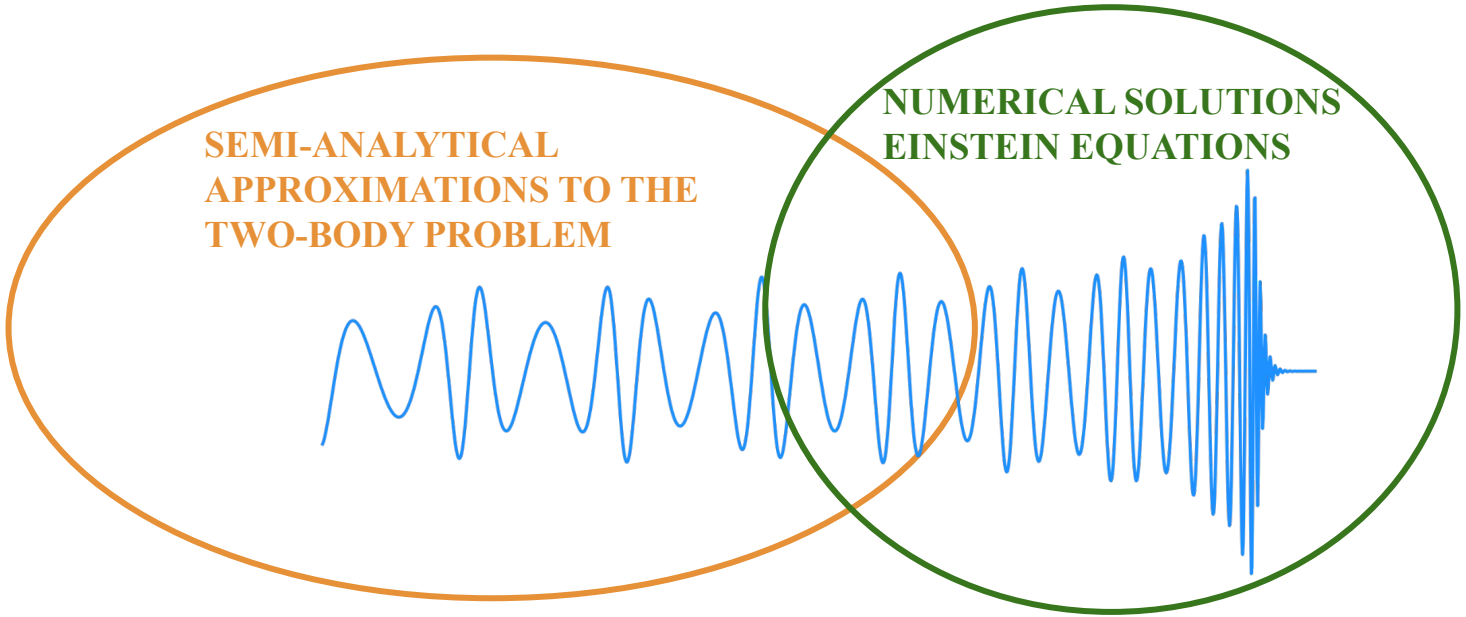

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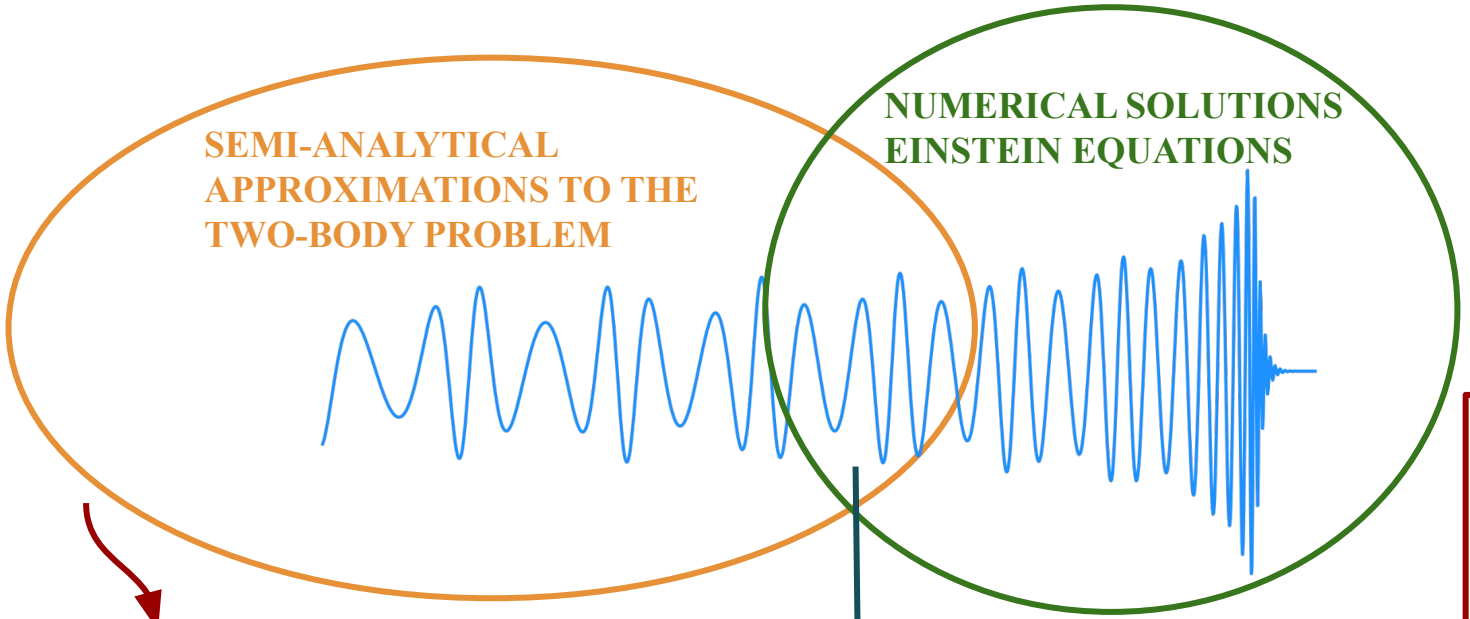

Numerical relativity simulations of binary black holes with SURF HPC grant of 8.7e6 SBUs

Ansatz based on theoretical predictions fit to numerical solutions

PHENOMENOLOGICAL MODELING FRAMEWORK

RESEARCH PROJECT

Waveform model development

Efficient and accurate model for gravitational waves (GWs) from **generic binary black holes** (BBHs)

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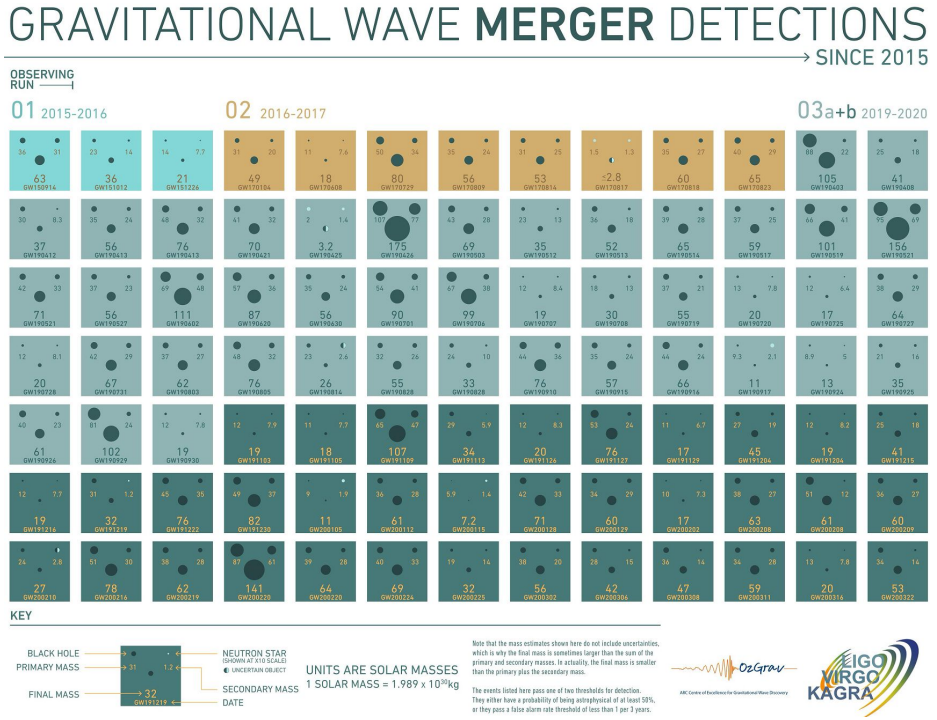
Observational results on open detector data

- **Search** for generic BBHs
- **Measure eccentricity** of binaries (origin)
- **Test General Relativity**



IMPACT

Short term

IMPACT

Short term **Origin of binary black holes**

IMPACT

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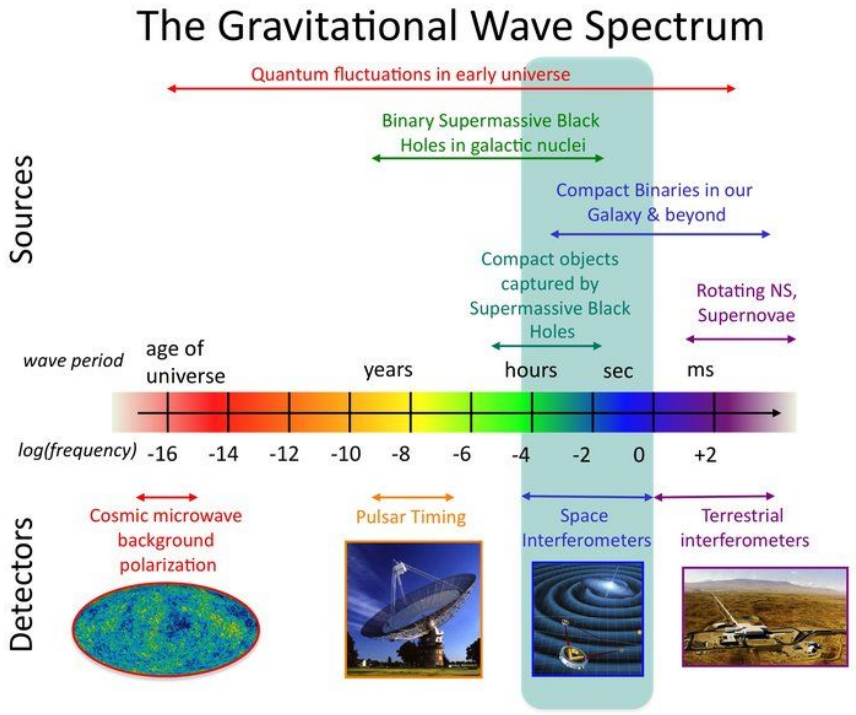
Eccentric binaries → Science case of **Einstein Telescope, LISA, ...**



Credit: NASA Goddard Space Flight Center