

# Gravitational waves

## THEORETICAL AND EXPERIMENTAL ASPECTS

Gianluca Gemme, Andrea Chincarini, Fiodor Sorrentino

### PART I

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#### The weak field limit of General Relativity

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  - 1.3. *Tensors*
  - 1.4. *Covariant derivative*
  - 1.5. *Geodesic equation and geodesic deviation*
  - 1.6. *The Einstein equation*
2. The weak-field limit of the Einstein equation
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  - 2.2. *The Lorentz gauge*
  - 2.3. *The transverse-traceless gauge*
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### PART II

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  - 4.2. *The interaction in the proper detector frame*
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- 8.3. *Displacement noise*
  - 8.3.1. Thermal noise and the Fluctuation-Dissipation theorem
  - 8.3.2. Seismic and Newtonian noise
- 8.4. *Other noise sources*

## PART III

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- 9. Optical configurations
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- 10. Thermal compensation
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- 11. Squeezing
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- 12. Technologies for the third generation detectors
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  - 12.3. *Alternative technologies (atomic sensors, torsion bars)*

## PART IV

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### Data analysis

- 13. Matched filtering
- 14. Coalescence of compact binaries (BBH, BNS)
- 15. BBH detections and tests of general relativity
- 16. GW170817 and multi-messenger astronomy

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