

YONSEI UNIVERSITY INTENSIVE COURSE

GRAVITATIONAL WAVES

Course Syllabus

Tjonnje Li

7–11 November 2016

I Schedule

Day 1: Brief Introduction to General Relativity

Differential geometry, Einstein tensor, stress-energy tensor, Einstein's field equations

Day 2: Properties of Gravitational Waves

Description of gravitational waves, properties of gravitational waves, effects of gravitational waves, energy of gravitational waves, propagation of gravitational waves

Day 3: Sources of Gravitational Waves

Continuous gravitational waves, Gravitational-wave bursts, stochastic gravitational-wave background

Day 4: Gravitational-wave Detectors

Resonant mass detectors, interferometric detectors (ground and space), pulsar timing array, cosmic microwave background

Day 5: Science with Gravitational Waves

Test of general relativity, cosmology, nuclear equation of state, stellar & galaxy formation

II Resources

General Relativity

- C. Misner, K. Thorne, and J. Wheeler. *Gravitation*. WH Freeman & co, 1973
- B. Schutz. *A first course in general relativity*. Cambridge university press, 2009

Gravitational Waves

- J. D. Creighton and W. G. Anderson. *Gravitational-wave physics and astronomy: an introduction to theory, experiment and data analysis*. John Wiley & Sons, 2012
- M. Maggiore. *Gravitational waves*. Oxford University Press, 2007

Gravitational-wave Science

- B. Sathyaprakash and B. F. Schutz. "Physics, Astrophysics and Cosmology with Gravitational Waves". *Living Reviews in Relativity* 12.2 (2009)