

1. Record Nr.	UNINA9910300377103321
Autore	van Haasteren Rutger
Titolo	Gravitational Wave Detection and Data Analysis for Pulsar Timing Arrays [[electronic resource] /] / by Rutger van Haasteren
Pubbl/distr/stampa	Berlin, Heidelberg : , : Springer Berlin Heidelberg : , : Imprint : Springer, , 2014
ISBN	3-642-39599-6
Edizione	[1st ed. 2014.]
Descrizione fisica	1 online resource (149 p.)
Collana	Springer Theses, Recognizing Outstanding Ph.D. Research, , 2190-5053
Disciplina	539.754
Soggetti	Observations, Astronomical Astronomy—Observations Statistics Gravitation Computer science—Mathematics Computer mathematics Astrophysics Astronomy, Observations and Techniques Statistics and Computing/Statistics Programs Classical and Quantum Gravitation, Relativity Theory Mathematical Applications in Computer Science Astrophysics and Astroparticles
Lingua di pubblicazione	Inglese
Formato	Materiale a stampa
Livello bibliografico	Monografia
Note generali	Description based upon print version of record.
Nota di bibliografia	Includes bibliographical references and index.
Nota di contenuto	Foreword -- Introduction -- Bayesian data analysis of Pulsar Timing Arrays -- Gravitational-wave memory and Pulsar Timing Arrays -- Limiting the gravitational-wave background with EPTA data -- Marginal likelihood calculation with MCMC methods -- Index.
Sommario/riassunto	Pulsar timing is a promising method for detecting gravitational waves in the nano-Hertz band. In his prize winning Ph.D. thesis Rutger van Haasteren deals with how one takes thousands of seemingly random timing residuals which are measured by pulsar observers, and extracts information about the presence and character of the gravitational

waves in the nano-Hertz band that are washing over our Galaxy. The author presents a sophisticated mathematical algorithm that deals with this issue. His algorithm is probably the most well-developed of those that are currently in use in the Pulsar Timing Array community. In chapter 3, the gravitational-wave memory effect is described. This is one of the first descriptions of this interesting effect in relation with pulsar timing, which may become observable in future Pulsar Timing Array projects. The last part of the work is dedicated to an effort to combine the European pulsar timing data sets in order to search for gravitational waves. This study has placed the most stringent limit to date on the intensity of gravitational waves that are produced by pairs of supermassive black holes dancing around each other in distant galaxies, as well as those that may be produced by vibrating cosmic strings. Rutger van Haasteren has won the 2011 GWIC Thesis Prize of the Gravitational Wave International Community for his innovative work in various directions of the search for gravitational waves by pulsar timing. The work is presented in this Ph.D. thesis.
