GR 13: Gravitationswellen II

Zeit: Donnerstag 16:45–17:25 Raum: A214

GR 13.1 Do 16:45 A214

Mock Data Challenges for LISA Pathfinder — •Anneke Monsky[1], Gudrun Wanner[1], Miquel Nofrarias[1], Ingo Diepholz[1], Martin Hewitson[1], Gerhard Heinzel[1], Adrien Grynagier[2], Mauro Hueller[3], Luigi Ferraioli[3], Stefano Vitale[3], and Karsten Danzmann[1] — [1]Albert Einstein Institut, Max Planck Institut fuer Gravitationsphysik, Institut fuer Gravitationsphysik Universitaet Hannover, Callinstr 38, 30167 Hannover — [2]Institut für Flugmechanik und Flugregelung. 70569 Stuttgart — [3]Università di Trento, I-38050 Povo (Italy)

LISA Pathfinder is an ESA space mission designed to test critical technologies for the joint ESA/NASA mission LISA (Laser Interferometer Space Antenna). The main mission goal of the LISA Technology Package (LTP) aboard LISA Pathfinder is the verification of free-fall between two test masses with an accuracy of about $3 \times 10^{-14}\,\mathrm{m\,s^{-2}} / \sqrt{\mathrm{Hz}}\,[1 + (\mathrm{f}/3\,\mathrm{mHz})^2]$ in a measurement bandwidth (MBW) between 1 mHz and 30 mHz.

The data analysis of the LISA Technology Package (LTP) will comprise a series of discrete experiments, each focussing on a particular noise measurement or characterisation of the instrument in various operating modes. Each of these experiments must be analysed and planned in advance of the mission because the results of a given experiment will have an impact on those that follow. As such, a series of Mock Data Challenges (MDCs) will be developed and carried out with the aim of preparing the analysis tools and optimising the various planned analyses.

GR 13.2 Do 17:05 A214

LISA onboard ranging and data communication capabilities — •Juan Jose Esteban Delgado, Antonio Garcia Marin, Iouri Bykov, Johannes Eichholz, Joachim Kullmann, Gerhard Heinzel, and Karsten Danzmann — Max-Planck-Institut für Gravitationsphysik (Albert-Einstein-Institut) and Universität Hannover. Callinstrasse 38 30167 Hannover, Deutschland

The Laser Interferometer Space Antenna (LISA) is a joint ESA and NASA mission to detect and observe gravitational waves from low-frequency sources. LISA consists of three spacecraft separated by 5 million kilometers forming an equilateral triangle and communicated via three bidirectional laser links. The primary quantity to be measured is the relative pathlength variation between the free-floating test masses onboard two different spacecraft by means of heterodyne interferometry with picometer sensitivity.

Due to relative movements between the spacecraft, the interferometer arms are unequal and time-varying. Therefore, to achieve the necessary interferometric sensitivity, the absolute distance between the spacecraft has to be measured. To this end, the LISA lasers must be phase modulated with pseudo-random noise sidebands, which also enable data transfer between the satellites.

This work presents a modulation scheme with submeter ranging accuracy and several kilobytes data rate. Its functionality was already demonstrated in a software simulation and in a FPGA-based hardware implementation. The next step will be an optical experiment with LISA representative hardware.