GR 14: Experimental Tests

Zeit: Donnerstag 16:45–17:45 Raum: VMP6 HS C

GR 14.1 Do 16:45 VMP6 HS C

Precision test of General Relativity with Galileo navigation satellites — •Daniela Kunst, Sven Herrmann, Felix Finke, Meike List, Benny Rievers, and Dirk Pützfeld — Center of Applied Space Technology and Microgravity (ZARM), University Bremen, Bremen, Germany

Einstein's theory of general relativity leads to various predictions that have already been verified by experiments, such as the perihelion shift of Mercury or the gravitational redshift. The best measurement of the gravitational redshift up to today has been achieved with the Gravity Probe A experiment in 1976 with an uncertainty of $1.4 \cdot 10^{-4}$. Today, two of the Galileo navigation satellites provide us with an excellent opportunity to improve this uncertainty. GSAT0201 and GSAT0202 have accidentally been injected onto an eccentric orbit, so that the onboard accurate, stable atomic clocks experience a daily modulation of the gravitational potential resulting in a measurable dilation of time. Using the data obtained by the satellites and a sophisticated model for the influence of solar radiation pressure on the satellites we aim to analyse the data and determine this time dilation to high accuracy and therewith improve previous results.

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GR 14.2 Do 17:05 VMP6 HS C

First test of the Weak Equivalence Principle in space: Preparation of the data analysis for Microscope — •Stefanie Bremer, Meike List, Benny Rievers, and Hanns Selig — ZARM, Universität Bremen

With the launch of the French satellite Microscope in April 2016, the first space-based experiment to test the Weak Equivalence Principle (WEP) will start. The mission aims at improving the accuracy of the Eötvös parameter η by three orders of magnitude compared to present tests. The experiment is carried out with two capacitive differential accelerometers each equipped with two cylindrical test masses. The satellite will be operated in drag free mode which means that all disturbances are reduced to a minimum by the attitude control system in order to achieve high-precision differential acceleration measurements. Nevertheless residuals will remain due to various sources. In preparation of the data analysis, the Microscope team at ZARM performs simulations in order to characterise the environmental conditions Microscope will be exposed to on its orbit. The simulation results serve as input to the data reduction procedures that are established at ZARM. The project status and the intended data analysis scheme will be presented.

GR 14.3 Do 17:25 VMP6 HS C

Characterization of the TARGET Readout Electronics — •Manuel Kraus, Stefan Funk, and Adrian Zink — ECAP, Erlangen, Deutschland

The future ground-based gamma-ray experiment Cherenkov Telescope Array (CTA) will feature multiple types of imaging atmospheric Cherenkov telescopes, each with thousands of pixels. To be affordable, camera concepts for these telescopes have to feature low cost per channel, on the other hand the requirements given by the CTA consortium have to be met in order to reach the scientific goals.

We present the Compact High Energy Camera (CHEC) concept for CTA and introduce the Application-Specific Integrated Circuit TARGET (TeV Array Readout Electronics with GSa/s sampling and Event Trigger). One of these chips provides 16 parallel input channels, a 16k sample buffer for each channel, full waveform information in a tight readout window and adjustable sampling rate. We show preliminary results of the characterization and testing of this readout electronics performed at the Centre for Astroparticle Physics in Erlangen.