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Measuring Relativistic effects in the field of the Earth with Laser Ranged Satellites and the LARASE research program

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The main goal of the LARASE (LAser RAnged Satellites Experiment) research program is to obtain refined tests of Einstein's theory of General Relativity (GR) by means of very precise measurements of the round-trip time among a number of ground stations of the International Laser Ranging Service (ILRS) network and a set of geodetic satellites. These measurements are guaranteed by means of the powerful and precise Satellite Laser Ranging (SLR) technique.
In particular, a big effort of LARASE is dedicated to improve the dynamical models of the LAGEOS, LAGEOS II and LARES satellites, with the objective to obtain a more precise and accurate determination of their orbit. These activities contribute to reach a final error budget that should be robust and reliable in the evaluation of the main systematic errors sources that come to play a major role in masking the relativistic precession on the orbit of these laser-ranged satellites. These error sources may be of gravitational and non-gravitational origin.
It is important to stress that a more accurate and precise orbit determination, based on more reliable dynamical models, represents a fundamental prerequisite in order to reach a sub-mm precision in the root-mean-square of the SLR range residuals and, consequently, to gather benefits in the fields of geophysics and space geodesy, such as stations coordinates knowledge, geocenter determination and the realization of the Earth's reference frame.
The results reached over the last year will be presented in terms of the improvements achieved in the dynamical model, in the orbit determination and, finally, in the measurement of the relativistic precessions that act on the orbit of the satellites considered.