Constraints on the equivalence principle provided by recent LLR data analysis

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Résumé

Abstract

We present a new constraint on the violation of the equivalence principle provided by a recent
Lunar Laser Ranging (LLR) data analysis. First we present quickly an overview of the ephemeris
INPOP17a [1]. Then we describe how to test the universality of free fall (UFF) with LLR data,
in particular the parameters that are sensitive to LLR data. The quantitative result is exposed:
we find no violation of the UFF at the (–3.8 ± 7.1) × 10 –14 level [2]. A new theoretical interpretation of this result is given, in terms of dilaton theory. Finaly, we compare this constraint to
MICROSCOPE experiment's result [3]. The LLR result about UFF is shown to be qualitatively
different from MICROSCOPE's. Indeed, MICROSCOPE experiment can test the week equivalence
principle, whereas LLR data can test the strong equivalence principle, so even if LLR constraint is
quantitatively not as good as MICROSCOPE's, it remains interesting. References

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