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SYMPOSIUM ON TECHNOLOGICAL REQUIREMENTS FOR FUTURE SPACE ASTRONOMY AND SOLAR-SYSTEM SCIENCE MISSIONS (A7)
Scientific Motivation and Requirements for Future Space Astronomy and Solar System Science Missions (2)

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TESTING GENERAL RELATIVITY IN THE SOLAR SYSTEM

Abstract

General relativity is one hundred years old. Since the time of its formulation, Einstein's theory has proven to be the best description of gravitational phenomena over a huge range of scales, from laboratory to cosmological. Decades and decades of verification did not show significant discrepancy between theory and experiment. Yet the theory is challenged in many directions. Theoretical findings point to almost necessary corrections to the theory, in order to reconcile it with quantum principles. The various "darks" showing up in the astrophysical and cosmological settings call for explanations possibly involving other fundamental "gravitational" fields, adding to the metric one of general relativity.

However, looking with a certain detail at the phenomenological evidence supporting the current knowledge of the gravitational interaction, we find poor *precise* evidence at scales starting from the Solar System dimension upward, and a corresponding proliferation of "alternative" theories. Indeed, the Solar System remains a privileged arena for performing precise tests of gravitation, and these are in a sense strictly related to the exploration of Solar System itself. In this talk the main gravitational phenomenology in the Solar System will be discussed, along with a selection of past and current test. Emphasis will be given both to main results and technological requirements, stressing on current limitation and possible ways of improvement.