THE CHINESE UNIVERSITY OF HONG KONG

Department of Physics

COLLOQUIUM

Precision Test of Frame-Dragging and General Relativity with Laser-Ranged Satellites

by



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Date: July 30, 2026 (Thursday)
Time: 4:00 - 5:00 p.m.
Place: L3, Science Centre, CUHK

(Light refreshments will be served at SCNB 1/F lobby from 3:30 to 3:50 p.m.)

ALL INTERESTED ARE WELCOME
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Abstract

Frame-dragging, that is, the dragging of spacetime by a rotating mass, is an intriguing phenomenon predicted by the general theory of relativity (GR), with relevant astrophysical implications including the emission of gravitational waves by coalescing spinning black holes. We report the recent precision test of frame-dragging using two laser-ranged satellites. The LARES 2 (LAser RElativity Satellite), owing to its optimized orbit and next generation design too, enabled, together with its predecessor LAGEOS (LAser GEOdynamics Satellite), a measurement of frame dragging with a relative uncertainty at the level of one part in a thousand. This result provides a stringent confirmation of GR in the near Earth environment and places strong constraints on alternative gravitational theories that predict deviations specifically in frame dragging, including scalar–tensor extensions such as Chern–Simons gravity with potential cosmological implications. Beyond tests of fundamental physics, the combined analysis of LARES 2 and LAGEOS also improves the determination of Earth's lunisolar tides, illustrating the broader geophysical impact of high precision relativistic satellite experiments.

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