

# MECHANICAL AND AEROSPACE ENGINEERING COLLOQUIUM SERIES

“Gravity Probe B”

Dr. William Bencze  
Coherent Navigation

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1:30PM

205 Thurston Hall

Refreshments: 2:30pm, 206 Thurston Hall

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## ABSTRACT

Gravity Probe B, a NASA-sponsored astrophysics satellite developed at Stanford University and the Lockheed Martin Corporation, was successfully launched on 20 April 2004 from Vandenberg AFB to test to some fundamental predictions of Einstein's general theory of relativity: the geodetic and frame-dragging effects. The concept of the experiment is deceptively simple: place a perfect gyroscope in orbit, isolate it from all classical disturbance torques, and measure the spin axis drift caused only by the warping and twisting of space due to the gravitational mass of the Earth. Making this simple concept a reality has proved to be confoundingly difficult and has resulted in arguably the most sophisticated scientific satellite developed to date. This talk will examine the predictions of Einstein's theory of general relativity, describe the design of the spacecraft and the science instrumentation at its core, discuss many of the novel technologies developed and engineering breakthroughs required to build the instrument and the detail the results of this ambitious experiment.

## BIO

William Bencze received his Bachelors degree in Electrical Engineering from Stanford University in 1989, followed by a PhD in 1996 with a specialization in precision instrumentation and automatic control systems. On Gravity Probe B he developed the electrostatic suspension systems used on orbit, served as the overall electronics systems manager for the GP-B spacecraft prior to launch, and was Program Manager at Gravity Probe B from 2005-2008 during the data analysis phase. Presently, he is as a senior advisor to the GP-B program as well serving as the COO of Coherent Navigation, an advanced satellite navigation technology company in Silicon Valley. Professional interests include hybrid and nonlinear control systems, gravitational and inertial measurement systems, analog electronics design, and precision instrumentation systems for space borne and terrestrial scientific and high reliability applications.