

Abstract Submitted
for the 4CF10 Meeting of
The American Physical Society

Stability of Inverted Pendulum and Heisenberg Uncertainty Principle JEREMY REDD, ALEXANDER PANIN, Utah Valley University — Classical inverted pendulum can stay in the position of its unstable equilibrium (upside-down) indefinitely. However, due to the Heisenberg uncertainty principle no object can have both its position and its momentum to be absolutely certain at the same time. This fundamental principle applies to inverted pendulum resulting in impossibility to have even an unstable equilibrium. As a consequence, inverted pendulum has only a finite time to stay near its classical equilibrium position before it falls. Surprisingly, this time for a macroscopic-size pendulum (say, a pen on its tip) is only a few seconds long. In this presentation we analyze the time scales of “quantum mechanical instability” of inverted pendula of various lengths to see how quantum mechanics interferes with the behavior of classically-macroscopic objects.

Alexander Panin
Utah Valley University

Date submitted: 15 Sep 2010

Electronic form version 1.4