

A Computational, Experimental, and Theoretical Approach on Pendulums, Molecular Dynamics, and Formation of Presolar Carbon in Asymptotic Giant Branch Stars

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2025 November 14 Friday 3:00 PM

Physics Seminar in Neckers 440

Abstract: The simple pendulum is a mass on a string, which oscillates in space and time. There are multiple ways to manipulate the pendulum to explore the center of mass of rigid and non-rigid objects, the Lorentz Attractor, conservation of energy, wobbling of a non-uniform mass on a string, molecular dynamics of protein structures, and the formation of presolar carbon within stellar atmospheres of asymptotic giant branch stars. With the aid of computer-based pendulum models and real-world pendulum models, a damped and driven non-linear pendulum demonstrates a Lorentz Attractor. The molecular dynamics of Leaf-Branch Compost Cutinase and presolar carbon formation in asymptotic giant branch stars demonstrates a wave-like behavior conserving energy.

Biography: Ryan Molitor has an Associate's of Science in engineering from St. Charles Community College. A Bachelor's of Science in physics and astrophysics from the University of Missouri-St. Louis. A Master's of Science in physics from Southern Illinois University-Carbondale. Since 2015 to 2025, he has been invited to the Congress of Future Science and Technology Leaders, attended the NASA Missouri Space Grant Consortium, attended the 7th Institute of Molecular Science Education (I-COMSE), and attended the 77th International Symposium on Molecular Spectroscopy (ISMS). He served as a teaching and research assistant at the University of Missouri-St. Louis Graduate School and teaching assistant at Southern Illinois University-Carbondale Graduate School. He is interested in the motions of the macroscopic universe,

motions of the microscopic universe, 3D printing, and engineering.