

CSU PHYSICS COLLOQUIUM

“Alice In-Between Worlds: The Wonderland of Dusty Plasma”

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Monday, Sept. 23rd at 4:00pm

120 Engineering (Hammond Auditorium)

Abstract

Why, sometimes I've believed as many as six impossible things before breakfast.

~Lewis Carroll. Alice in Wonderland

Order and stability in the giant world of stars and galaxies is dominated by the force of gravity. In contrast, the tiny world of atomic and subatomic particles is held together by nuclear and quantum forces. As one sizes up from the subatomic to the astronomical scales, a natural question emerges: What fundamental principles govern the world of the “in-between”? In other words, what happens to the laws of nature when the time and spatial scales are neither large nor small? In this talk, I invite you to a journey through the mesoscopic wonderland of dusty plasma, where principles are semi-classical, forces are non-linear, thermodynamics is non-equilibrium, and dimensions are quasi-defined. We will tour this *almost impossible* world by exploring dusty plasmas in nature and laboratory, both on Earth and in space.

Bio

The best that most of us can hope to achieve in physics is simply to misunderstand at a deeper level.

~ Wolfgang Pauli

My primary research interests lie along the intersections of fundamental physics and applied mathematics. Those include the onset of exotic transport behavior in disordered media, nonlocal interactions in correlated systems, self-organization and stability of dusty plasmas in gravity and microgravity conditions, thermodynamics of non-Hamiltonian systems, and dust particle techniques for plasma diagnostics. I have authored a book on the application of a novel spectral approach to transport problems in two-dimensional physical systems.

The success of my research is largely fueled by cross-disciplinary collaborations with mathematicians, numerical physicists, and experimental research teams (such as the CASPER experimental group).