

Nuclear Engineering and Radiological Sciences

Fall 2019 Colloquium

Alice In-Between Worlds: The Wonderland of Dusty Plasma



Evdokiya (Eva) Kostadinova, Ph.D.

Assistant Research Professor
Center for Astrophysics Space
Physics and Engineering
Research (CASPER)
Baylor University

Friday, November 22nd
4 pm – 5 pm

White Auditorium,
Cooley Building

Refreshments served at 3:45pm

*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.

Dr. Kostadinova obtained her Bachelor's degree in Physics at Furman University in South Carolina in 2014. She received her Doctoral degree in December 2017 from Baylor University. The focus of her dissertation was employing new mathematical techniques in the study of transport in two-dimensional disordered systems. Her dissertation work was published as a book by Springer in 2018.

Currently, Dr. Kostadinova works as an assistant research professor at Baylor University's Center for Astrophysics Space Physics and Engineering Research (CASPER). Her primary research interests lie along the intersections of fundamental physics and applied mathematics. Those include the onset of turbulence and instabilities 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. Dr. Kostadinova's works for the Plasmakristall-4 project – the latest dusty plasma laboratory on board the International Space Station. Most recently, her work has focused on developing a spectral approach to the onset of Kolmogorov turbulence in dusty plasma liquids.



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