Online LTP Seminar
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Connecting particle growth and pattern formation in the Magnetized Dusty Plasma Experiment

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Over the last three decades, plasma scientists have learned how to control a new type of plasma system known as a “complex” or “dusty” plasma. These are four-component plasma systems that consist of electrons, ions, neutral atoms, and charged, solid, nanometer- to micrometer-sized particles. The presence of these microparticles allow us to “tune” the plasma to have solid-like, fluid-like, or gas-like properties. This presentation introduces the physical properties of dusty plasmas – focusing on how the small charge-to-mass ratio of the charged microparticles gives rise to many of the characteristics of the system. In particular, dusty plasmas can be used to study a variety of processes in non-equilibrium or dissipative systems such as self-organization and energy cascade as well as a variety of transport and instability mechanisms. This presentation will discuss results from our studies of pattern formation (i.e., filamentation) in strongly magnetized plasmas and dusty plasmas in high ($B \geq 1$ T) magnetic fields using the Magnetized Dusty Plasma Experiment (MDPX) device at Auburn University. This presentation will show the presence of these filamentary structures can influence the morphology of growing particles in reactive plasmas.

Short Bio

Dr. Edward Thomas, Jr. is Professor of Physics and the Interim Dean of the College of Sciences and Mathematics at Auburn University. He earned his Ph.D. in Physics from Auburn University. Dr. Thomas began his research career studying edge particle transport in fusion plasmas. Over the years, his work has become centered in basic plasma physics where his group conducts experimental plasma physics research on dusty (complex) plasmas, magnetized plasmas and plasma diagnostic development – with an emphasis on the particle, wave, and energy transport in low temperature plasmas. Most recently, he has led the development of the Magnetized Dusty Plasma Experiment (MDPX) device, a superconducting, 4-Tesla, multi-configuration, collaborative research platform for studying plasmas in which the electron, ion, and charged microparticle components are dominated by the presence of the magnetic field.