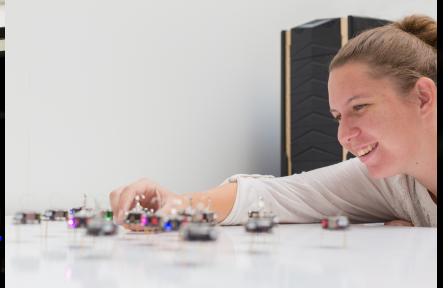

Physics colloquium

Towards a realistic minimal model of long-range plant pathogen transport by wind

Professor Oleg Boris Kogan
Department of Physics
CSU San Luis Obispo

Date: **1/22/19**
Time: **2:30 PM**
Location: **SSM 217**

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Abstract:
In this talk I will describe our effords to construct a minimal model of continental scale transport of wind-borned fungal plant pathogens. The starting point in this effort (Phys. Rev. E 96, 022220), focused on the competition between the short-range hopping mechanism of transport due to turbulence in the Earth's atmospheric boundary layer, and the laminar advective mechanism due to currents above the boundary layer. The key finding was that the latter is often the dominant mechanism that moves invasion fronts. However, the basic model lacks sufficient biological realism, and over-predicts the speed of invasions. Recently, we further developed the basic model in several directions. First, we incorporated the effect of spore death due to UV exposure – a crucial factor known to phytopathologists. Second, in addition to mobile spores we now include immobile fungi, as well as the role of latent time required for new fungus to start producing spores. Our study shows that while these additions allow for slowing down of the invasion speed closer to realistic values, the dominance of the advective mechanism appears to persist - a potentially important finding for phytopathologists and agriculture.